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FOR ARCHAEOLOGY

VOLUME SIX

INVESTIGATIONS IN SOUTHWEST YUKON

NUMBERS 1 AND 2

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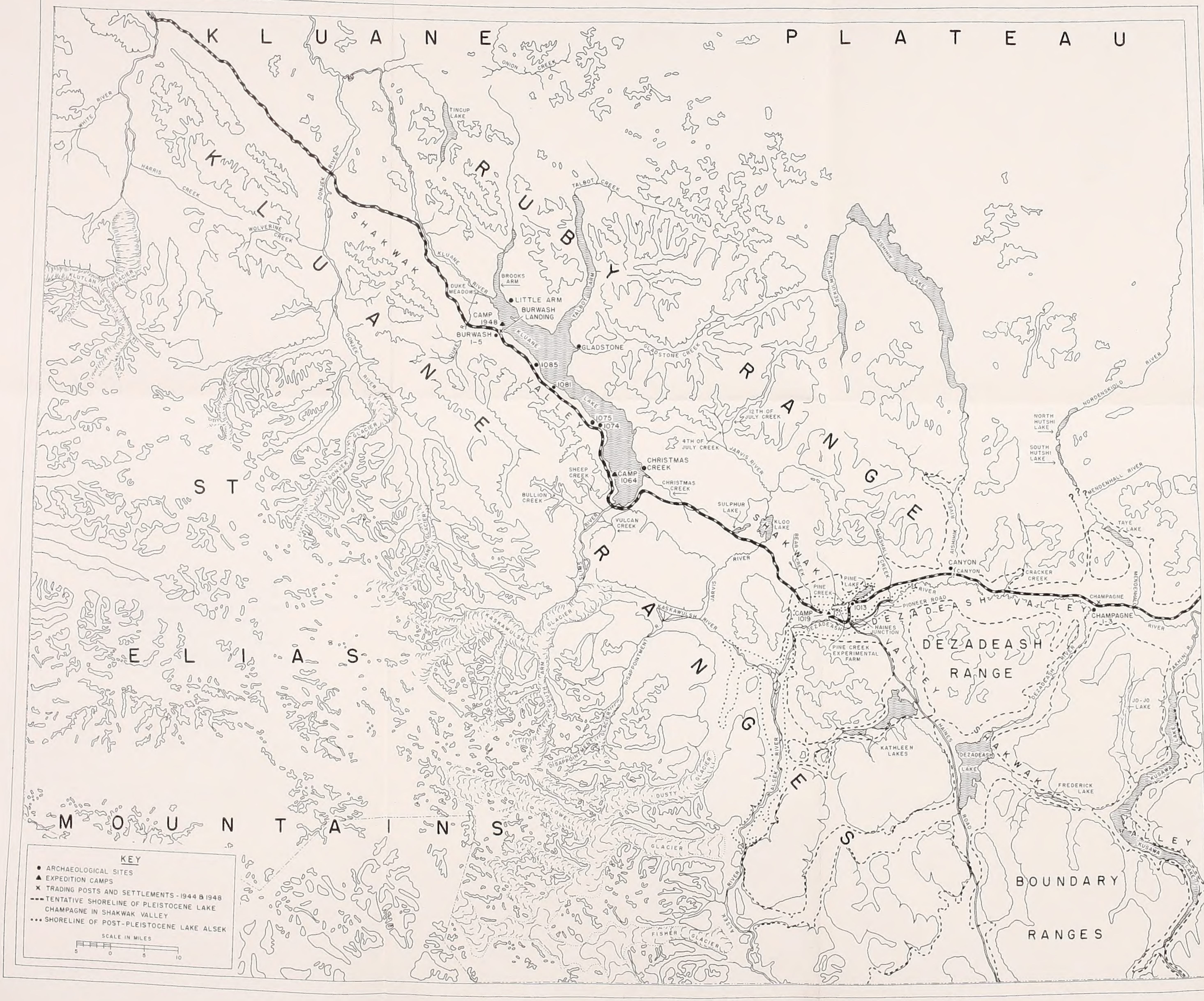
Fig. 1. Map of area in southwest Yukon surrounding the Kluane Lake Basin and the Dezadeash and Shakwak Valleys. Base map from Canada Department of Mines and Technical Surveys, maps 115 A, B, G, H. Topographic and other features after Bostock, 1952, map 1012A and Kindle, 1953, map 1019A.


KLUANE PLATEAU
KLUANE RANGE
RUBY RANGE
ST. ELIAS MOUNTAINS
DEZADEASH RANGE
BOUNDARY RANGES
SHAKWAK VALLEY
DEZADEASH VALLEY
KLUANE LAKE
BROOKS ARM
LITTLE ARM
BURWASH LANDING
CAMP 1948
BURWASH 1-5
DUKE MEADOWS
GLADSTONE
1085
1081
1075
1074
CAMP 1064
CHRISTMAS CREEK
SHEEP CREEK
BULLION CREEK
VULCAN CREEK
SULPHUR LAKE
KLOO LAKE
CANYON
CRACKER CREEK
CHAMPAGNE
CHAMPAGNE 1-3
PINE LAKE
PINE CREEK
CAMP 1019
1013
HAINES JUNCTION
PIONEER ROAD
PINE CREEK EXPERIMENTAL FARM
KATHLEEN LAKES
DEZADEASH LAKE
FREDERICK LAKE
JO-JO LAKE
TAYE LAKE
NORTH HUTSHI LAKE
SOUTH HUTSHI LAKE
AISHIHIK LAKE
SEKULMUN LAKE
TINCUP LAKE
WHITE RIVER
HARRIS CREEK
WOLVERINE CREEK
KLUTLAN GLACIER
DONJEK RIVER
DONJEK GLACIER
DUKE RIVER
KLUANE RIVER
ONION CREEK
TALBOT CREEK
TALBOT ARM
GLADSTONE CREEK
12TH OF JULY CREEK
4TH OF JULY CREEK
JARVIS RIVER
SLIMS RIVER
KASKAWULSH GLACIER
KASKAWULSH RIVER
DISAPPOINTMENT R.
DISAPPOINTMENT GLACIER
DUSTY GLACIER
LOWELL GLACIER
FISHER GLACIER
ALSEK RIVER
BEAR CREEK
MARSHALL CREEK
AISHIHIK RIVER
DEZADEASH RIVER
MENDENHALL RIVER
NORDENSKIOLD RIVER
TAKHINI R.
KUSAWA LAKE
HAINES ROAD
KEY
ARCHAEOLOGICAL SITES
EXPEDITION CAMPS
TRADING POSTS AND SETTLEMENTS - 1944 & 1948
TENTATIVE SHORELINE OF PLEISTOCENE LAKE CHAMPAGNE IN SHAKWAK VALLEY
SHORELINE OF POST-PLEISTOCENE LAKE ALSEK
SCALE IN MILES
5 0 5 10

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INVESTIGATIONS IN SOUTHWEST YUKON

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PAPERS OF THE
ROBERT S. PEABODY FOUNDATION
FOR ARCHAEOLOGY

VOLUME SIX — NUMBER ONE

PAPERS OF THE
ROBERT S. PEABODY FOUNDATION
FOR ARCHAEOLOGY

Volume Six — Number One

INVESTIGATIONS IN SOUTHWEST YUKON

GEOBOTANICAL AND ARCHAEOLOGICAL RECONNAISSANCE

BY
FREDERICK JOHNSON AND HUGH M. RAUP

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PREFACE

The delay in publication of the present monograph has had its compensations. Assembly of the results of the work of the Andover-Harvard Yukon Expedition commenced in 1949 with a number of long reports to various sponsors. These we purposely withheld from publication because they were little more than detailed digests of our field notes. Preparation of a final report was prevented by many unforeseen incidents.

We were followed in the field in immediately subsequent years by students in various disciplines. Informal discussions of their findings altered the perspective with which we viewed our own work. Botanical investigations in nearby regions were of interest to us and geological studies in the Shakwak and adjacent valleys were particularly significant. The researches of MacNeish were perhaps of greatest concern for he had succeeded in accumulating a considerable body of new data.

As time went on all of these data and the many ideas and opinions began to appear against the rather broad background of our own collaborative endeavor and it became essential that we publish this so that it might become available to everyone concerned. The inclusion of MacNeish's report and analysis is a logical consequence of our interest in the developing knowledge of southwestern Yukon.

It had been possible for MacNeish to excavate a number of sites in southwestern Yukon during the seasons of 1959 through 1961. Although MacNeish and Johnson discussed numerous problems and compared collections at various times following 1959, publication of closely integrated reports was not considered until mid-1963. By this time the form and content of our manuscript was well established and MacNeish's manuscript was in primary draft. It was obvious that there was a close relation and a continuity between the two works and so publication in closely associated monographs was desirable.

The two numbers of volume six which are bound together cannot be considered a collaboration although we have worked closely together during the final stages of preparation. The objectives of the Andover-Harvard Yukon Expedition were quite different from those of MacNeish. The first impulse to combine all the data into a single report was tempered by the revelation of differences especially in interpretation in the two works. We present, therefore, two separate reports each of which can be considered on its own merits but which when combined constitute a significant larger unit. Essentially, the report by Johnson and Raup includes the geobotanical data and appropriate primary description of the archaeological material discovered. MacNeish's report emphasizes the archaeological data and includes his interpretation of its significance.

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INTRODUCTION

The present paper contains the results of combined archaeological and geobotanical research in parts of the Shakwak and Dezadeash Valleys, southwestern Yukon, in 1944 and 1948. The area with which we are primarily concerned is the valley of the Dezadeash River between the vicinity of Champagne and Bear Creek, then the Shakwak Valley northwestward approximately to the White River, embracing the basin of Kluane Lake (Fig. 1).

Archaeological evidence of ancient human occupance in this area was found by us in the summer of 1944. Having found this evidence, it became our avowed purpose to attempt a reconstruction of the landscapes in which the human culture it represented probably developed. A basic premise underlying our study of the ancient culture has been that the life of the people and of the animals they hunted has always been dependent upon the general nature of the vegetation. This in turn has been conditioned and reconditioned by evolving land forms and soils, under changing climates.

The field parties in both 1944 and 1948, in addition to the authors, included Lucy G. Raup and Karl and David Raup as botanical assistants. In 1944, Dr. John H. H. Sticht, at that time a graduate student in geology at Harvard University, served as geological assistant. That same season, Dr. Stuart K. Harris of Boston University served as cook. He made small collections of plants and birds. In 1948, Dr. Elmer Harp of Dartmouth College was archaeological assistant, and Dr. William H. Drury of the Hatheway School, Massachusetts Audubon Society, was a botanical assistant. Both of these men were likewise graduate students at Harvard at the time.

It was agreed among the field parties at the outset of each season that the aims of the study, dependent as they were upon the correlation of materials from the various disciplines, should take first priority. To keep these aims in view, it was agreed that the parties should work together whenever possible. In practice this meant that when time, location, and the progress of the season's plans made it appear advisable to collect botanical data, the whole party combined its energies to this end. Or if a promising archaeological site was found, everyone contributed to the necessary excavation and recording of information. In each such case there was abundant discussion, not only of the immediate problem at hand, but also of the many others related to it in adjacent fields of major interest. It would have been possible to approach our central problem along three separate lines. Archaeologists, geologists, and biologists might have operated independently, achieving descriptions and analyses which might be fitted together to form a consistent whole. Our work has demonstrated that these three lines of attack are not separable in reality, and we believe that progress with such problems as

ours can best be achieved by active collaboration and a free interchange of ideas while the raw data are being gathered in the field. Whatever ideological barriers there are between the various disciplines are most easily broken at this level. Such a collaboration is a balance among aims and methods that often is difficult to accomplish, but the resulting satisfactions fully repay the effort.

The archaeological work of the expedition was limited to reconnaissance. Prior to 1944, no archaeological sites had been found along the Alaska Highway, but there had been vague reports of stone tools being found in scattered locations south of Whitehorse. Belying these reports was a strong and general opinion that the country had not been inhabited earlier than protohistoric times. Discussions of the results of previous geobotanical investigations by Raup and Denny along the Highway south and east of Whitehorse led to an opinion that a collaborative analysis of the development of the topography and vegetation would lead us to the prehistoric human camp sites which we were convinced must be there. The first archaeological discovery, the "Little Arm" Site on the bay of Kluane Lake since renamed Brooks Arm, was a fortunate one for both of us and for MacNeish who followed. The soils including the artifacts had not been disturbed subsequent to original deposition. Study of the soils, the artifacts and the general situation of this site in relation to the landscape provided a sound foundation for the expansion of our search for prehistoric archaeological sites in the sections of the Dezadeash and Shakwak Valleys accessible to us. In 1948, concentration on the original discoveries and the search for detailed information enlarged our ideas and understanding. These were also valuable to MacNeish who has said that he did not need to spend much time in preliminary explorations. Taking his directions from our discoveries he commenced detailed reconnaissance and excavation practically upon arrival in the region.

Following the test excavations at the Little Arm Site our work was devoted to the discovery and location of as many sites as we could find. In 1944, the reconnaissance covered various sections of the Highway between Fairbanks and Dawson Creek. By 1948, hypotheses stemming from the archaeological and geobotanical investigations led us to concentrate our work in the Dezadeash and Shakwak Valleys, and in the Kluane Lake basin. The major objective of the archaeological work was again to discover as many sites as possible and to test the most promising in order to locate the levels of occupation in the regional profile. This we knew would fill out the results of the geobotanical studies.

During the two field seasons about forty archaeological sites were discovered in the region. Some of these sites are represented by a few artifacts found on the surface. At other sites limited exploratory excavations were profitable. This report is mainly concerned with this work. Sites west of Kluane Lake and in Alaska as well as those east and south of Whitehorse are described with a minimum of comment. MacNeish's success at some of the sites we led him to, and significantly at others he found, has been most gratifying. His resources permitted excavation

on a much larger scale than was feasible for us. This has rounded out the archaeological picture and despite minor disagreement over details has largely confirmed our discoveries and initial interpretations.

The material evidence of an ancient human culture in the Dezadeash and Shakwak Valleys lies buried in deposits of earth. This at once poses difficult problems, notably those of discovery. But at the same time it supplies a mechanism for interpretation of the evidence wherever the latter may be found. The mechanism becomes useful provided, a) the origin and developmental history of the deposits can be deduced from our present knowledge of geomorphic processes, and b) the biological elements of the landscape can be reconstructed by projecting what we know of living plants and animals against the evolving soils and landforms.

Our discussion of these problems will deal first with the development of landforms and soils, second we will discuss the significance of the excavations of the human remains. A third section traces the history of the vegetation. Finally we present a reconstruction of the whole landscape during the period in which we believe the region has been inhabited by people. Of necessity this reconstruction will be in broad terms. For purposes of the present paper, for example, the basic vegetational problem resolves itself into whether most of the Shakwak Valley was in forest or tundra-grassland vegetation during the long period of occupance by the people who made the buried tools. Therefore the descriptions of vegetation here will be limited mainly to forest, grassland, and tundra. Other types of vegetation, and the many problems relating to the flora and its distribution, will be mentioned not at all or only as the need arises.

At the time of our field studies in the Dezadeash and Shakwak Valleys in 1944 and 1948, there had been very little investigation of the surficial geology of the area. Prospecting and mining operations had led to considerable reconnaissance of the bedrock geology, with incidental descriptions of the overburden and its topography (McConnell, 1905; Cairnes, 1914, 1917A, 1917B; Cockfield, 1927). The construction of the Alaska Highway greatly facilitated the explorations of the Geological Survey of Canada in southern Yukon. In 1945, Dr. H. S. Bostock of the Survey made a reconnaissance geological map of a strip along the Highway between Champagne and the Yukon-Alaska boundary. His report (1952) contains brief but excellent descriptions of the surficial deposits in the Kluane Lake basin. Between 1946 and 1950, Dr. E. D. Kindle was in charge of a series of field survey parties in the Dezadeash region, which embraces the part of Shakwak Valley that lies between Champagne and Kluane Lake. His report on the region, published in 1953, contains a wealth of information on access and transportation, natural resources, topography and surface deposits.

In the field season of 1944, Dr. Sticht made a reconnaissance study of the surficial geology of the region along the Highway between Champagne and Fairbanks, with most of his work centered in the area between Haines Junction and the Duke River. Sticht's data and his interpretation of them are embodied in his doctoral dissertation at Harvard, and remain unpub-

lished. Most of his field data have now been confirmed and duplicated in the later work of Bostock and Kindle, but some basic elements in his interpretations appear to be unique.

No member of our field party in 1948 could claim proficiency in geomorphology; nevertheless we made a great many observations that become meaningful when correlated with those of others. Some of these notes resulted from archaeological excavations, while others came from direct attempts to determine the age and manner of development of the surfaces on which we were working. We confirmed most of Sticht's observations of 1944 and added much detail to them. Also we buttressed our confidence in Sticht's general interpretation of the postglacial history of deposits in the valleys. The later work of Bostock and Kindle brings all our field data, and such interpretation as we were able to make earlier, into a broader and more realistic perspective.

Thus the present analysis of the origin and development of the topography and soils is based upon an amalgam of data and ideas from four major sources. First and second are two published Memoirs of the Geological Survey of Canada (Bostock, 1952; Kindle, 1953); third is the unpublished doctoral dissertation by Sticht (1951); and fourth are our own field notes of 1944 and 1948.

Detailed botanical knowledge of our area was extremely scanty prior to 1944. A few plants had been collected by Adolf Muller in 1920, variously labeled: Dezadeash Lake, Bear Creek, or Kluane Lake to Donjek River (cf. Hulten, 1940). The existence of the natural grasslands in the Shakwak and Dezadeash Valleys had, of course, been well known for many years, and they had been used by the Jacquot Brothers of Burwash as grazing for their horses. No description of the flora existed, however, nor was there an account of the general disposition of the vegetation over the landscape.

The analysis of the vegetation presented in the present paper is based primarily upon data collected by our field parties of 1944 and 1948 (cf. Raup, 1944, 1945b). Vascular plant specimens total about 2250 collection numbers. Descriptive notes in more or less detail, usually including plant lists, were made for approximately 110 specific study areas or sites representing the various types of terrain and vegetation.

A few other sources of material have been used wherever they have made significant contributions. The late J. P. Anderson made a collecting trip along the Alaska Highway in the summer of 1944, and very kindly sent duplicates of his specimens from our region. Mr. F. S. Nowosad, of the Canadian Department of Agriculture, collected plants from the grasslands of the lower Dezadeash Valley and the vicinity of Pine and Bear Creeks. Dr. C.H.D. Clarke made small collections on the mountain slopes south of Burwash and along the Haines Road. M. P. and R. T. Porsild collected a great deal of material along the Haines Road, particularly near the Yukon-British Columbia border. All of this specimen material has been available to us. In 1945 a Dominion Experimental Farm was established along the Alaska Highway at the crossing

of Pine Creek in the Shakwak Valley (mile 1019). Information on soils and productivity derived from experience there proved useful to us. A brief description of the vegetation in the Dezadeash Map-area was published by Dr. E. D. Kindle (1953) in the pages introductory to his discussion of the geology of the area. Also a short description of the topography and vegetation appeared in a paper on the bird life of the region published in 1953 by Dr. William A. Drury who was a member of our field party in 1948 (Drury, 1953). A few notes on the vegetation of the Quill Creek area, in the mountains southwest of Burwash, were published by Love and Freedman (1956). They accompany a list of plant species collected in the area by Freedman in the summer of 1953. In establishing the general geographic relationships of the plant life of the Dezadeash and Shakwak Valleys, the following works have been the major sources: Hulten (1940-49); A. E. Porsild (1951, 1959); Anderson (1943-52); Raup (1934, 1935, 1936, 1945A and 1945B, 1947a).

Fifteen years ago, in 1944 and 1948, our archaeological discoveries were unique. The Campus site near Fairbanks, Alaska, was the nearest one producing artifacts which were at all comparable. These finds in Alaska led N. C. Nelson to observe that some of the materials, especially microblades and polyhedral cores were reminiscent of Mongolian artifacts. Largely due to him the name Lake Baikal was entering the American literature where, until rather recently, it has been a name to conjure with. The artifacts from the Tanana River Valley excavated mainly by Rainey during the 1930's belonged with occasional exceptions in later periods than the ones we were dealing with. The absence of comparable late prehistoric and protohistoric materials in the collections from our reconnaissance puzzled us greatly. Excavations far to the south and east and west of this region had produced, in some instances, artifacts exhibiting similarities in form or technique of manufacture suggesting possible common origin. However, the distances between discoveries were so great and the situation relative to geomorphologic considerations was so poorly known that it was impossible to present the artifacts found in the Dezadeash and Shakwak Valleys in any reasonably derived cultural sequence covering an area wider than the region in which we had worked. Therefore all that could be done, fifteen years ago, was to describe the discoveries and wait until a physically tough and intellectually enterprising soul collected more data from this archaeologically forbidding region. The man we were waiting for turned out to be MacNeish. His work in northwestern Canada led him to the Yukon River Valley and eventually to the Kluane Lake basin and the Dezadeash and Shakwak Valleys.

There has been mutual profit from the exchange of information and ideas between us. MacNeish has accepted the results of our geobotanical researches and we have incorporated data which he has provided. In our archaeological research we have maintained our original objective, that is, to describe the artifacts and the sites we found with particular reference to the results of the geobotanical investigations. We could

hardly do more unless we purloined MacNeish's data before it was fully published and attempted our own interpretation. The extent to which we agree, or perhaps better, may disagree with MacNeish is possibly a subject for another paper.

ACKNOWLEDGEMENTS

It would be impossible to acknowledge all of the essential help given us by many people during the planning and execution of our field work. At many points this assistance was crucial, and we hope that those who came to our aid at these times will understand that they are fully appreciated though they must remain unmentioned personally.

Financial support for the work came from several sources. The Wenner-Gren Foundation of New York made the largest single contribution, to the archaeological research of 1948. Other sums came from the R. S. Peabody Foundation for Archaeology, the American Philosophical Society, the Arctic Institute of North America, and the Milton Fund of Harvard University. The geological work of Dr. Sticht in 1944 was supported by a grant from the Penrose Fund of the Geological Society of America.

The expedition of 1944 was made during the late war, while the Northwest Service Command of the U. S. Army was operating along the Alaska Highway. Our work in southwestern Yukon was rendered possible at that time by an arrangement made with the Army through what was known as the Joint Economic Committees of Canada and the United States, whereby we were supplied with military transport and permission to purchase supplies from Army bases. This proved highly satisfactory, and we are greatly indebted to the Northwest Service Command for many kindnesses given us over and above the required essentials.

GEOLOGY AND GEOGRAPHY

GEOGRAPHY OF LAND FORMS AND SURFICIAL DEPOSITS

The Shakwak Valley is a great structural depression which runs northwesterly from the mouth of the Takhini River (Fig. 1). In its course it is occupied at intervals by a part of Kusawa Lake, and by the basins of Frederick, Dezadeash, Kathleen, Kloo, and Kluane Lakes (Kindle, 1953, p. 11). This valley (Fig. 2c) separates two major physiographic provinces: the coastal St. Elias Mountains to the southwest, and Yukon Plateau to the north and northeast. Outliers of the St. Elias which form the valley walls are the Boundary and Kluane Ranges (Fig. 2a), with altitudes from 7,000 to 8,000 feet above sea level. Northeast of the valley the Yukon Plateau (Fig. 2b), which in this region has the local name Kluane Plateau, has a rolling surface with a general elevation of about 5,000 feet above which there are small mountain ranges that rise 1,000 to 2,500 feet above the general level (Bostock, 1952, p. 9). The most prominent of these are the Dezadeash Range north of Dezadeash Lake, and the Ruby Range north of the Dezadeash River and Kluane Lake.

The Kluane Plateau in the southeasterly part of the area with which we are concerned is deeply dissected, chiefly by glaciers that flowed northerly and easterly from the coast ranges. The Dezadeash River flows northeastward from Dezadeash Lake through one of the valleys in the plateau to the vicinity of Champagne, where it turns sharply westward in a much larger valley. The latter depression is the one now traversed by the Alaska Highway, and was the scene of a considerable part of our field work. It is about 30 miles long and 4 to 6 miles wide in the area between Champagne and its mergence with the main Shakwak Valley west of Pine Lake; but in reality it is continuous eastward to the Lewes River Valley, so that its overall length is about 80 miles (Kindle, 1953, p. 12).

The Dezadeash River, after flowing westward in the above-mentioned valley about 30 miles, flows diagonally across the floor of the Shakwak Valley and then turns abruptly southward through a gap in the Kluane Ranges (Fig. 3b). Shortly it receives the Kaskawulsh River from the west, and together these two streams form the Alsek River which continues southwestward through mountainous terrain to the Pacific. Hereafter the name "Dezadeash Valley" as used in this paper will refer to the area between Champagne and the point where the river turns southward through the Kluane Ranges. Elevations in this valley are comparatively low. They range from about 1,850 feet at the mountain gap to about 2,500 feet at the base of the valley walls. The greatest altitude reached along the Highway is about 2,400 feet between Champagne and Cracker Creek.

Northwest of the Dezadeash there is a height of land in the Shakwak Valley that separates the Dezadeash-Alsek drainage from the Kluane Lake basin. Along the Alaska Highway this is crossed at an altitude of about 3,400 feet. The surface of Kluane Lake lies at 2,525 feet (Bostock, 1952,


a


b


c

Fig. 2. The Shakwak Valley and the Kluane and Ruby Ranges. _a_. Prairie opening in forest at mile 1019 (Pine Creek) with Kluane Range in the background (June 26, 1944). _b_. View from mountain summit north of Ptarmigan Heart Valley, in Ruby Range. Note rounded summits and gentle upper slopes (July 16, 1948). _c_. Shakwak Valley, view west from old beach of Lake Alsek near mile 1021. Bear Creek terraces are to the right, and the creek runs across the valley floor (June 10, 1948).


a
b
c
d
e
f

Fig. 3. Alsek Valley and Kluane Lake. a. Kluane Lake: panoramic view northwestward from an altitude of about 5300 feet on a mountain slope just east of the lake. The delta of Silver Creek is at the right, and Slims River enters the lake just beyond the slope in the left foreground (July 18, 1944). b. Gap in the Kluane Range: the Dezadeash River runs from left to right under the mountain wall. It joins the Kaskawulsh River behind the wooded knoll to form the Alsek River which drains through the gap to the Pacific (June, 1948). c. Slims River delta and Kluane Lake: view southwestward from an altitude of about 5300 feet (July 18, 1944). d. Talbot Arm of Kluane Lake: view northwestward from above timber line on a mountain slope about ten miles south of the northern end of the Arm (August 20, 1944). e. Talbot Arm of Kluane Lake: view southward from near the base of a mountain slope on the east shore about ten miles south of the northern end of the Arm (August 20, 1944). f. Floodplain of Slims River: view southward from Alaska Highway crossing. Soil is fine-textured silt, with scanty vegetation of caespitose grasses (September 4, 1948).

Map 1012A) (Fig. 3a). Its main source of water is Slims River, a glacial stream from the mountains to the southwest which flows into the lake at the southeastern extremity (Fig. 3c). The lake is about 36 miles long, and has one large fjord-like arm, called the Talbot Arm, extending northward about 22 miles into the Ruby Range (Figs. 3d and 3e), and a smaller one, the Brooks Arm, extending northward about eight miles from near the northwestern end (Fig. 8a). The drainage of the lake is westward through Kluane River to the Donjek River, another glacial stream issuing from the mountains west of the lake (Fig. 1). About thirty miles west of the Donjek the White River crosses the Shakwak Valley. The White River rises from Russell Glacier in the mountains of southeastern Alaska, crosses the Yukon-Alaska border, and flows northeastward to the Yukon. In its course it receives the waters of the Donjek.

An outstanding fact emerging from the foregoing general view of the topography is that while the Kluane Lake basin drains northward into the Yukon, the Dezadeash Valley drains through rugged coastal mountains to the Pacific. This difference is of long standing in the history of landforms and soils in the area, and has had large effect upon the development of the biota. The Yukon drainage has been relatively unimpeded since the disappearance of glacial ice from the Kluane basin. Mountain glaciers such as the Lowell and Fisher, on the other hand, have periodically closed the drainage of the Alsek River, damming the water back to form great lakes in the Dezadeash and tributary valleys. Kindle (1953, p. 21-3) discusses the present situation of Lowell Glacier with respect to the Alsek River. This situation is a sensitive one, and even minor changes in the glacial fronts may be recorded as lake beds, beaches, wave-cut terraces, or other phenomena in the valley. Such can be correlated with climatic and other events in the history of the landscape.

Most of the surficial soils in the Shakwak and Dezadeash Valleys are fine-textured silts, interspersed locally with till, outwash gravel and sand. Many of the silts have been deposited by wind, while others are water-laid. The principal sources of the aeolian silt are in the glaciated valleys of the coastal cordillera which margins the Shakwak Valley on the south (Bostock, 1952, p. 35). Many of these valleys contain glaciers at their heads and in their upper levels -- glaciers which yearly produce large quantities of silt-laden melt water which comes down into the Shakwak depression. The silts are deposited on extensive floodplains at the mouths of the mountain streams (Fig. 3c). There, during the summer and autumn, they dry out and are picked up by strong down-valley winds, and are carried for many miles.

The climate of the Shakwak and Dezadeash Valleys is exceedingly dry, and from their structure and geographic position we may assume that it has been relatively dry throughout postglacial time. The valleys are also characterized by the high winds above mentioned, which blow down the tributary valleys from the neighboring mountains to the southwest during warm weather. These are foehn winds, and are also a

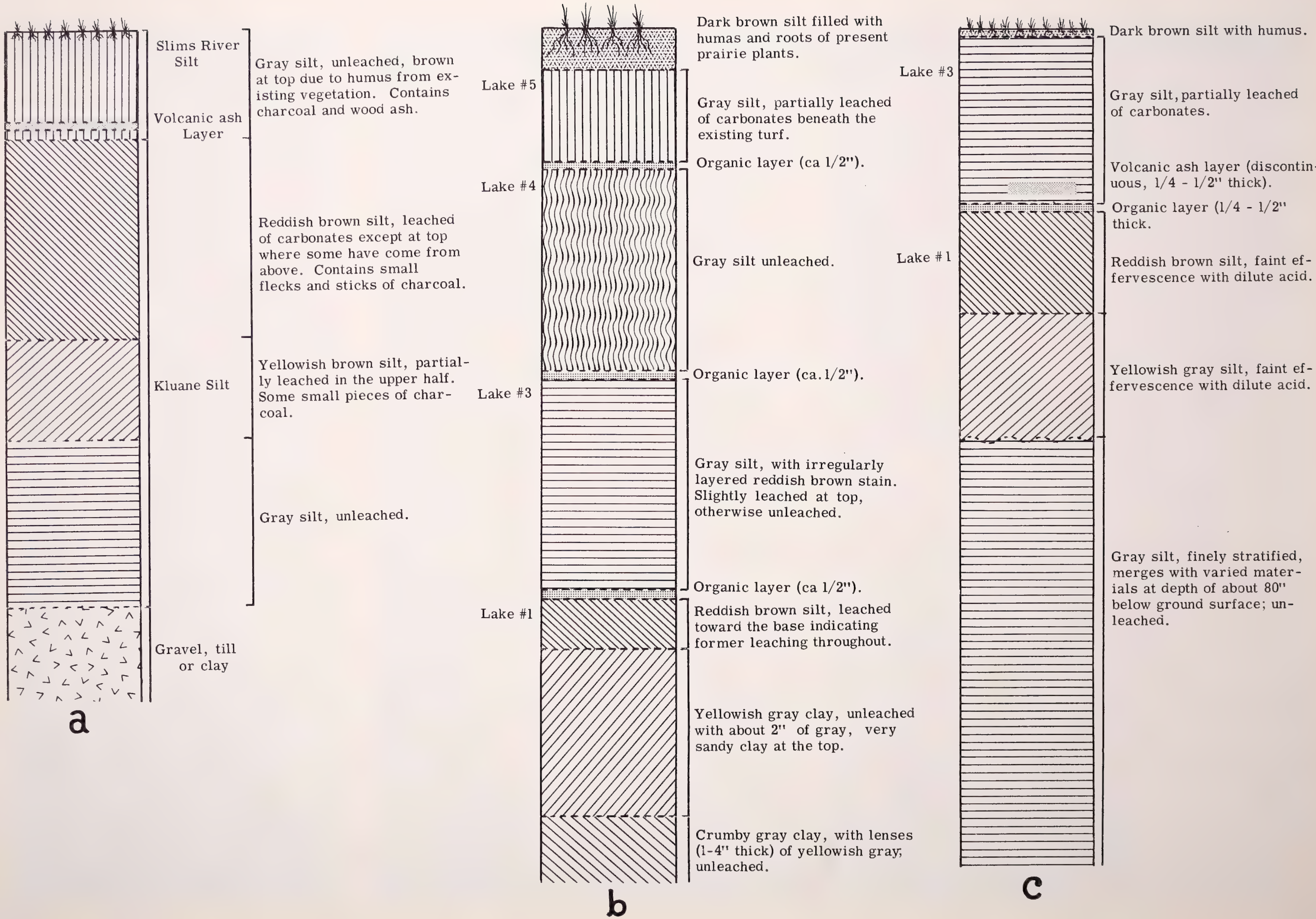
function of the general structure of the landscape. Therefore it may be assumed that they have been effective in moving the silts for a long time. In fact this process is going on currently, and clouds of dust over a thousand feet thick may be seen emerging from the lower valleys of the glacial streams (Fig. 4a).

Of great significance for all studies of the surficial deposits is a layer of volcanic ash that appears in most soil profiles in the Shakwak and neighboring valleys (Fig. 5a, c). It is usually thin in this region, from a mere trace to two or three inches thick but clearly definable. The ash was first described in some detail by Capps (1916), who traced its origin to an eruption in the coast ranges near the Alaska-Yukon boundary about 10 miles south of the point where the White River crosses the boundary. This places it about 65 miles due west of the northwestern end of Kluane Lake. Capps dated it as having occurred about 1,400 years ago, or about 500 A. D. The dating was done by counting tree rings in a series of overlapping forest beds exposed in a deep peat deposit which developed on top of the ash. More recently Bostock (1952, p. 36-9) restudied Capps' data on the distribution of the ash, added a great deal more, and constructed a new map showing two directions in which the ash was carried away from its source, one eastward and one to the north. Still more recently radiocarbon dates determined for the deposit of the ash yielded results which were remarkably close to those of Capps (Fernald, 1962). Layers of peat immediately below and above the ash gave ages, in one case of 200 ± 110 B. C. (I-275) and 430 ± 100 B. C. (I-276) respectively. This site was in a sand dune area in the upper Tanana River valley. Another sample similarly dated came from the floodplain deposit of the upper Tanana, where about six inches of layered peat were found immediately beneath the ash. The material came from the middle part of this deposit, and gave a maximum age of 2000 ± 250 years (W-978). Other radiocarbon dates were determined on wood found in the ash deposit; 344 A. D. ± 180 (C-101) and 490 ± 180 (C-101). If the sixteen dates available, including those of Capps are assembled they show a variation of about 950 years, i. e. from 288 B. C. to about 670 A. D. More realistic, however, is the fact that 12 of the 16 dates fall within a range of about 380 years, i. e. between 164 A. D. to 542 A. D. The average for all sixteen dates brings the age of the ash to about 300 A. D.

Morainic deposits consisting of till and sorted or partially sorted materials are found on the valley sides and bottoms. One of the largest of these deposits is a great arcuate terminal moraine about 4 miles long and 1/4 to 1 mile wide lying just east of Champagne (Kindle, 1953, p. 20) (Fig. 4b). The moraine forms a ridge 100-200 feet high above the valley floor, and is composed of sand, gravel, and boulders. It here divides the drainage of the Dezadeash from that of the Mendenhall River which flows into the Takhini in the easterly part of this valley. The Takhini in turn flows into the Lewes below Whitehorse. Another notable morainic area lies between Kluane Lake and the height of land near Jarvis River. This surface is characterized by "knob and kettle" terrain. Lateral

Fig. 4. Topographic features in the Dezadeash, Bear Creek and Slims River Valleys. _a_. Silt being blown from Slims River Delta by down-valley winds. View westward at Alaska Highway crossing (July 2, 1948). _b_. Glacial moraine just east of Champagne; sand dunes in foreground (June 22, 1948). _c_. Glacial lake terraces at Bear Creek in the Shakwak Valley. View westward along the floor of the Shakwak Valley; Kluane Range to the left (June 16, 1944).


a
b
c



Slims River Silt
Volcanic ash Layer
Kluane Silt
Gravel, till or clay
Gray silt, unleached, brown at top due to humus from existing vegetation. Contains charcoal and wood ash.
Reddish brown silt, leached of carbonates except at top where some have come from above. Contains small flecks and sticks of charcoal.
Yellowish brown silt, partially leached in the upper half. Some small pieces of charcoal.
Gray silt, unleached.
a
Lake #5
Lake #4
Lake #3
Lake #1
Dark brown silt filled with humas and roots of present prairie plants.
Gray silt, partially leached of carbonates beneath the existing turf.
Organic layer (ca 1/2").
Gray silt unleached.
Organic layer (ca.1/2").
Gray silt, with irregularly layered reddish brown stain. Slightly leached at top, otherwise unleached.
Organic layer (ca 1/2").
Reddish brown silt, leached toward the base indicating former leaching throughout.
Yellowish gray clay, unleached with about 2" of gray, very sandy clay at the top.
Crumby gray clay, with lenses (1-4" thick) of yellowish gray, unleached.
b
Lake #3
Lake #1
Dark brown silt with humus.
Gray silt, partially leached of carbonates.
Volcanic ash layer (discontinuous, 1/4 - 1/2" thick).
Organic layer (1/4 - 1/2" thick.
Reddish brown silt, faint effervescence with dilute acid.
Yellowish gray silt, faint effervescence with dilute acid.
Gray silt, finely stratified, merges with varied materials at depth of about 80" below ground surface; unleached.
c

Fig. 5. Cross sections of deposits in the Kluane Lake Basin and the Dezadeash Valley. a. Generalized profile of the soils in the Kluane Lake Basin. b. Profile of soils under a prairie at mile 1019. c. Profile of soils near Pine Creek at an altitude of 2,055 feet above sea level.

moraines consisting of till and sorted materials are conspicuous on the valley sides in several places. They appear as gently sloping benches, commonly at altitudes of 3, 500 to 4, 000 feet (Kindle, 1953, p. 19-20).

Fan-like deposits of gravel and sand are of common occurrence. One of the largest of these is at the junction of the Dezadeash and Shakwak Valleys, where a series of thick beds lies on the north side of the depression. These beds rise upwards of 130 feet above the valley floor, and are terraced on their southerly margins. They are dissected by Bear Creek, which flows into the Dezadeash near the point where the latter turns southward into the mountain gap. These deposits will be called the Bear Creek Gravels hereafter in the present paper (Fig. 4c). On the lower valley slopes on the southerly side of the Kluane Lake basin are gravel fans of varying prominence. Some of them, such as those of the Duke and Donjek Rivers are active, carrying wide braided streams. Others have steep gradients but are relatively quiescent and carry only small brooks. Some of the latter were formerly much more active, and formed points extending into Kluane Lake from the southwest shore (Figs. 3a; 11a, b; 14a).

Origin and Development of the Surficial Deposits

Comparison of three profiles made in the surficial deposits of the Shakwak and Dezadeash Valleys will bring out two contrasting sequences of development that are of large significance to the history of occupance. One of these is characteristic of the Kluane Lake basin, and can be seen in many places along the Alaska Highway and about the shores of Kluane Lake. The other two will be taken from the lower basin of the Dezadeash River.

In the Kluane profile there is a surface layer of fine-textured gray silt of varying thickness but commonly 6 to 8 inches (see Fig. 5a). It usually is turned brown or nearly black in its upper horizons by humus from existing vegetation, and it is essentially unleached of carbonates, effervescing strongly with dilute acid. At the base of this layer, or in places an inch or less above the base, is the layer of volcanic ash previously mentioned. Immediately beneath the ash and the gray silt is a much thicker layer of silt, commonly 36 inches or more. The upper 12-14 inches of this is reddish brown in color, and is almost completely leached of carbonates except at the top where it has received some from the upper silt. The reddish brown horizon grades downward into a poorly defined yellowish brown zone about 6 inches thick which is partially leached of carbonates, particularly in its upper half. Below this layer the silt is light gray in color and effervesces strongly with dilute acid. The silts, wherever their lower surfaces have been seen, rest directly upon glacial till, outwash, or varved clays, with no intervening organic horizons. Bostock (1952, p. 35-6) described these silt deposits in considerable detail, but did not mention the differential leaching that occurs in them.

The nature of these deposits indicates strongly that they are aeolian in origin (cf. Bostock, 1952). We found no high shorelines or any other evidence of high lake levels in the Kluane basin. A lake of sufficient duration to account for such silt deposits would have left conspicuous evidence of its shores. The differential leaching in the upper and lower parts of the profile indicates a break in the continuity of deposition. It strongly suggests that after the main mass of the silt was laid down, the top of which is now represented by the upper surface of the reddish brown horizon, there was a time interval during which no more was added. This period was long enough to complete the leaching of the upper 12-14 inches of the deposit (Sticht, 1951). Deposition then began again, shortly before the appearance of the volcanic ash about 300 A. D., and continues to the present. The lower silt will be called the Kluane Silt in the subsequent discussion, and the upper one the Slims River Silt because most of it appears to be coming from the floodplain of Slims River.

The horizons in this profile are extremely variable in thickness and attitude. In the lower Slims River valley and in the neighborhood of its mouth the upper silt may be as much as 3 feet thick. In many places both silts have been "reworked" by the wind, commonly with the formation of elaborate systems of dunes. Wide variations in the thickness of both silts are particularly noticeable on the northeast shores of Kluane Lake, from Gladstone Creek eastward, where Bostock (1952) described them. The Kluane Silt contains many small flecks of charcoal, and occasional small sticks of it. But nowhere in the Kluane Silt has there been found a widely continuous organic horizon. Wherever such horizons have been found they have been clearly recognizable as due to local redeposition of the silt by wind, or to equally local plant-site relationships such as develop on stream banks. The Slims River Silt, on the other hand, contains an abundance of organic horizons.

All of the evidence we found of early human occupance was located in the upper twelve to fifteen inches of the Kluane Silt. A few later types of artifacts were discovered in the Slims River Silt. MacNeish has added many details to these observations. His excavations particularly at Gladstone and the Little Arm sites have revealed incorporated in the Kluane Silt occasional hearths and possibly floors as well as lenses of ash ascribed to human occupation. Also he found well developed occupation zones in the Slims River Silt. Where such zones lie below the volcanic ash layer the Slims River Silt may be several inches thick.

In contrast to the above, a profile at a low altitude in the Shakwak Valley where the Dezadeash Valley merges with the latter, yields a series of fine-textured silts separated by thin but well defined organic horizons. This profile was located in a prairie at mile 1019 on the Highway, at an altitude of about 1, 950 feet, and is typical of many that were seen in this part of the valley (Fig. 5<u>b</u>). It contains four silts: three upper ones ranging in thickness from 8 to 12 inches, over a thick one of unknown depth, all separated from each other by organic beds. The number of the upper silts (from 1 to 3) was found to vary with altitude in the

valley, and locally according to the way in which the surface materials were redistributed after they were deposited. The upper silts usually are unleached except for the upper 2 to 2-1/2 inches beneath the present vegetation. In a few places they rest upon gravels but in most they overlie finely stratified silts or fine sands that have leached profiles reminiscent of those in the Kluane Silts.

The silts in the lower Dezadeash Valley are evidently of lacustrine origin (Kindle, 1953, p. 21-3), deposited in lakes formed and drained periodically by the advance and retreat of glaciers across the lower drainage of the Alsek River (see Fig. 6). These lakes have made gravel beaches on the valley slopes which are now clearly definable (Fig. 7a), and some of them formed wave-cut terraces on the flanks of the Bear Creek gravels (Fig. 4c) the altitudes of which conform to those of the lower beaches. Further, the number of beaches and terraces corresponds to the number of upper silts thus far found in the profiles. The volcanic ash horizon, so convenient as a time marker in the Kluane Lake basin, is present also in the Dezadeash Valley though here it is thin and scattered because it is farther away from its source. In the profiles where it is found it usually overlies a leached horizon as it does in the Kluane basin silts, marking the approximate close of a long period of relative stability in the land surface during which the leaching could occur.

Another soil profile made in the Dezadeash Valley illustrates the more significant of these features (Fig. 5c). It contains but one gray silt above a leached reddish brown horizon. The latter effervesces faintly with dilute acid, due no doubt to the percolation of carbonates downward from the overlying younger deposit. Further, in the lower part of the upper gray silt is the volcanic ash layer, thin and discontinuous but distinct. Also it should be noted that the upper gray silt itself is considerably leached, more so than the surface silts shown in Fig. 5b. Effervescence with dilute acid is scarcely more than in the reddish brown horizon beneath. Also, there is faint effervescence in the yellowish gray horizon, suggesting that some carbonates have filtered downward as much as 12-13 inches, and suggesting also that considerable time has elapsed since this surface was exposed. This profile was taken on the Dezadeash Valley slope near Pine Creek at an altitude of about 2,055 feet. This places it between the shorelines of the first and second of the later Alsek lakes (see Fig. 6) where it could have received only one of the recent silts. However, this silt is the oldest of the later group, and its geographic position has allowed it to be exposed continuously since its lake was drained. Hence it is leached more extensively than the later ones.

The history of landforms and surficial deposits in those parts of the Dezadeash and Shakwak Valleys discussed in this paper may be summarized as follows.

According to Kindle (1953, p. 14), the Dezadeash Valley was filled with ice, and the neighboring mountains were overridden to altitudes of

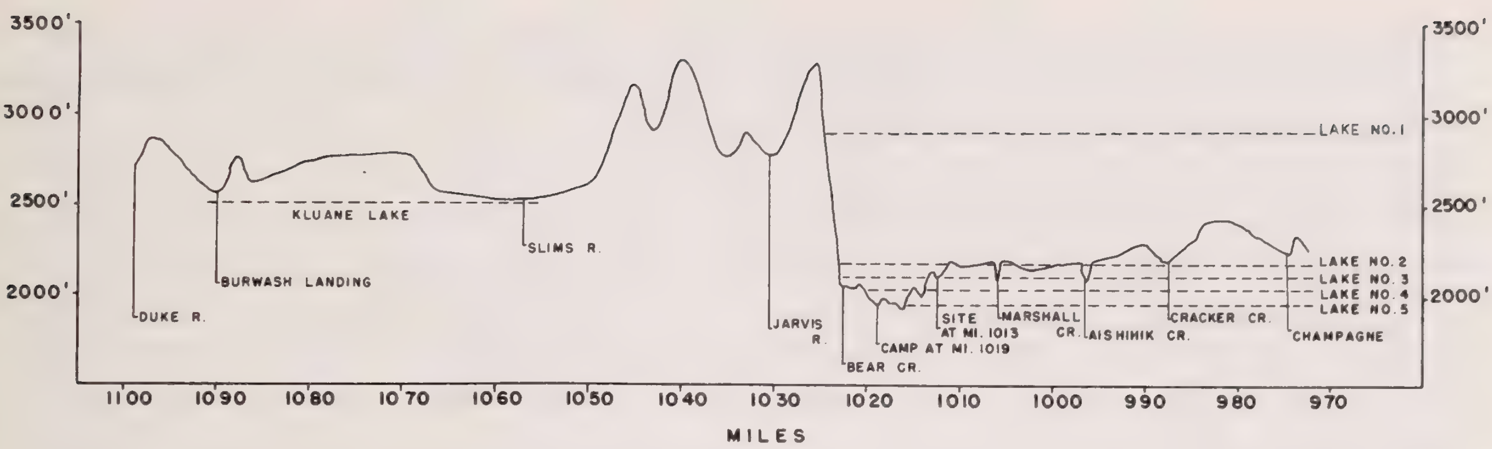


Fig. 6. Diagram to illustrate levels of post Pleistocene Lakes in the Shakwak and Dezadeash Valleys. This also indicates the relationship of the levels of the several Alsek Lakes to that of Kluane Lake.

6,000 feet during the last maximum glaciation. The ice came mainly from great icecaps in the Coast Ranges, and flowed down the valleys on their northeasterly slopes. Glacial ice from similar sources flowed into the basin of Kluane Lake. Bostock (1952, p. 13) noted evidence of glaciation up to about 5,200 feet in the Ruby Range northeast of Kluane Lake. Northward the thickness of the ice decreased.

As the ice melted away it left heavy morainic deposits on the valley sides and in various places on the valley floors. Large deposits are in the height of land area between Kluane Lake and the Dezadeash Valley, and in the great morainic "dam" at Champagne. Apparently drainage from the melting ice in the Kluane basin was always more or less adequate, northwestward into the Yukon system. A few varved clays in the basal deposits seem to indicate only small lakes formed during the recession of the ice.

In the Dezadeash-Alsek basin, on the other hand, a large lake was formed, for the normal drainage via the Alsek River into the Pacific was still closed by mountain glaciers. Kindle (1953, p. 15-17) has named this body of water Glacial Lake Champagne (Figs. 1; 5b, c; 6, Lake No. 1). It occupied most of the deeper valleys from the Takhini westward to the height of land above mentioned, and from the southern Shakwak Valley wall northward into the valleys draining the Kluane Plateau. Kindle found its shore lines in many places, ranging in altitude from 2,300 to 2,800 feet. Lacustrine deposits of various kinds were laid down in the lake. Kindle noted that the beds are largely of stratified silt, but he also saw areas of sand, particularly near the mouths of streams or near old shores. He noted that the sandy surfaces commonly had a dune topography oriented to a prevailing southwesterly wind. He thought there had been some icebergs in the lake, for he found pebbles and boulders sparsely distributed through the stratified silts. He found no varved clays associated with the deposits, but our field parties saw one outcrop of these clays along the Highway east of Aishihik River. We presume that the Bear Creek Gravels were deposited as a delta system in this

lake at some stage in its development or retreat. The basal portion of the sections shown in Figs. 5b and c, are believed to have been deposited for the most part in the bottom of this lake.

Kindle described other glacial lakes in his map area, only one of which lies in the district with which we are concerned. This was Glacial Lake Kloo (Kindle, 1953, p. 17-18), of which the present Sulphur and Kloo Lakes in the height of land area west of Bear Creek are remnants. Its shorelines were found by Kindle to be at about 3,000 feet. Little is known of the history or extent of this lake, though it is probable that it was not a large one.

In the Kluane Lake basin, as previously stated, there appears to be a notable absence of extensive lacustrine deposits, and the loessal Kluane Silt lies directly upon glacial till or outwash. The only exceptions to this are in local areas of redeposition or on steep mountain slopes where angular fragments have come down and been mixed with the till and loess by solifluction. During most or all of the long period when the basal lacustrine deposits were being laid down in Glacial Lake Champagne, the main mass of the Kluane Silt was being deposited. Its sources were of the same nature as those of the Slims River Silt now -- the broad flood-plains of the glacial streams issuing from the mountains immediately to the south west. During this time the general climate probably was somewhat cooler than it is now, for there is no evidence that the Alsek drainage was opened, which means that the mountain glaciers extended considerably farther down their valleys than they do now.

Bostock (1952, p. 6-8) has presented rather strong evidence that Kluane Lake was formerly lower and smaller than it is now. The best of this evidence is in the estuaries of Gladstone and Christmas Creeks, which are, in effect, "drowned." Judging by the topography of the Christmas Creek Valley in relation to the neighboring drainage basin of Jarvis River, Bostock thought that the lower lake level occurred "early in Recent time." By "Recent" he meant postglacial. He estimated that the level was at least 40 feet lower than the present one. Soundings toward the west end of the lake, where it empties into Kluane River, gave no depths greater than 20 feet. Bostock proposed, therefore, that when the level of the lake was at least 40 feet lower than now, its outlet was by way of the Slims and Kaskawulsh River valleys into the Alsek. His analysis of the topography of the valley floors involved would make this possible provided the moraines of the Kaskawulsh Glacier did not stand in the way. Bostock concluded (1952, p. 8) "that Slims River and Kluane Lake have been in existence as they are today for only a relatively short part of Recent time. At the close of the last major glaciation, Kaskawulsh Glacier receded at least some miles above its present position, and the basin of Kluane Lake drained up Slims River Valley and thence by Kaskawulsh Valley into Alsek River. This condition has persisted through most of Recent time. Some centuries ago the outlet was closed by the advance of the glacier, and Slims Valley and the basin of Kluane Lake were flooded to a level 30 feet above that of 1945. The lake then over-

flowed to the westward, developing the present outlet of Kluane River, which has quickly cut through the drift to its present level."

Bostock stresses the significance of fluctuations in the water level of Kluane Lake. He reports local information to the effect that the level has fluctuated as much as 10 feet within the period between 1900 and 1945. He thought this was due to the relative amounts of gravel, etc. deposited in Kluane River by the Duke River, and to varying amounts of water delivered to the lake by Slims River. In the summary paragraph quoted above he mentioned a relatively recent former level 30 feet higher than the present one, and elsewhere in his text he noted "a group of fresh shore lines only readily distinguishable at favourable places where exposure to wind and waves enabled them to be developed in a comparatively short time." However, he did not locate these shore lines or describe them in detail.

Several observations made by our field parties suggest at least modification of Bostock's proposed history of Kluane Lake. There is no question that the lake level fluctuates. Within one 2-week period of observation at one of our camps the water rose about 12 inches. The zonation of lichen growth on cliff shores usually gives a fair indication of maximum heights of water level over periods of approximately 50 years (L. C. Raup, 1930; H. M. Raup, 1957). Measurements of lichen zones made near mile 1064 on the south shore of Kluane Lake in July 1944 gave a maximum upper limit about 4-1/2 feet above the existing level.

There are a great many gravel and sand beaches along the south shore of the lake, most of them with a series of ridges more or less parallel to the shore. Having found artifacts in the Kluane Silt we began to study its local distribution in detail, and searched especially for its relationship to the lake margins. The upper Kluane Silt, together with the volcanic ash above it, was everywhere around the lake just above a beach that stood between 11 and 12 feet above the water level of 1944. Below that level they could not be found except in more-or-less vertical-faced terraces that were being cut back by wind and wave action. This proved to be true also at sites studied on the north shore, such as at the Little Arm site, and was confirmed again in 1948. From these data we conclude that there has been no water level on the shores higher than 11-12 feet above the present one since before Hypsithermal time, for the Kluane Silts found on the upper beaches are thoroughly leached of carbonates. If there was such a level it could have lasted almost no time at all without washing away the fine-textured silts.

A basic assumption upon which Bostock's theory rests is that the Alsek Valley was open throughout most of Recent (postglacial) time. On the contrary, there is a great deal of evidence that it was closed during the period of the deposit of the Kluane Silt, and until the advent of Hypsithermal time. It was in this long period that the thick lacustrine deposits were laid down in the Dezadeash and neighboring valleys under Glacial Lake Champagne (Lake No. 1, Fig. 6). This lake owed its existence to the damming of the Alsek. If this hypothesis is acceptable, then the only

period in postglacial history during which Kluane Lake could have drained out through the Slims River Valley was the Hypsithermal. Bostock suggests that with the Alsek presently open, and the Kaskawulsh River flowing at a much steeper gradient than Slims River, the Kaskawulsh may recapture the latter in the near future.

It may be that the western reaches of Kluane Lake were formerly deeper than they now are. The Duke River has three great outwash fans, progressively younger from east to west (Fig. 8a). The earliest one formed what is now nearly all of the shore of Kluane Lake from Burwash Landing to Kluane River. It was just off this shore that Bostock took his 20-foot soundings. Most of the surface of this fan is forested. It has volcanic ash on it, and some Kluane Silt, indicating that it was deactivated while the deposition of this silt was still going on. Farther west are the "Duke Meadows," a natural grassland on an adjacent fan that has neither ash nor Kluane Silt, showing that it was abandoned at some time within the last 1600-1700 years (see Fig. 29a). The present active fan is adjacent to this one, still farther west (Fig. 8a). It is not impossible that the valley of the Kluane River was considerably deeper when the ice melted out of it than it is now, and that it was gradually filled by these huge gravel fans. Most of this work was done prior to Hypsithermal time. If so, the lake would have started its existence at a relatively low level, as Bostock's evidence indicates that it did. But its history would be one of gradual rise to approximately its present level, with no requirement for its drainage through the Slims River-Alsek River system. Also there would be no requirement that it have a level in the recent past, at least for any length of time, that is higher than the present one.

Bostock also used the rate of fill in the delta of Slims River as evidence for the present condition of Kluane Lake being relatively recent. By comparison of earlier and more recent maps he computed that Slims River built its delta 1.7 miles into the lake between 1899 and 1947, though at different rates during that time. Using the minimum rate of 158 feet per year, he thought that the river might have "filled the 14 miles of valley, between the moraines in front of Kaskawulsh Glacier and the front of its delta in Kluane Lake, in less than 500 years." However, he thought that the time would actually be considerably less than 500 years because the valley would receive some of its fill from Vulcan, Bullion, and other tributary creeks (Bostock, 1952, p. 7-8). Here again Bostock's proposal rests upon there having been no western outlet for Kluane Lake lower than the barrier he found between Burwash and the entrance to Brooks Arm. If the lake deepened gradually due to the filling of a deeper outlet there by the Duke River, the time available for the Slims Valley fill would be greatly lengthened. Also the Hypsithermal period was probably one of little or no building activity in the delta.

When the Alsek drainage was freed by the retreat of the Lowell Glacier into its mountain valley, Lake Champagne completely disappeared. The fact of the glacial retreat appears to be clear evidence of a general warming trend in the regional climate, for there was no way to drain the

lake except to free the mountain gorges of their ice dams. We do not know whether the processes of climatic amelioration and drainage of the lake were both gradual, or whether the first may have been gradual and the second rather sudden. There is some evidence of a lake which stood in the valley with its surface at an altitude of about 2, 200 feet (Lake No. 2, Fig. 6). The highest wave-cut terraces in the Bear Creek Gravels are at this level, about 128 feet above the present level of Bear Creek where it crosses the Alaska Highway at the base of the gravels. It is not known whether this was merely a temporary halt in the withdrawal of the larger glacial lake or a readvance. In any case we believe, with Dr. Sticht, that this lake predated the final drainage of Lake Champagne and the long period of open land which followed. No clear evidence of it, other than the high terraces at Bear Creek has been found unless the latter can be correlated with the lowest of the Lake Champagne beaches noted by Kindle. Further, we have examined thick sections in the bluffs along Aishihik River where there are deeply leached, reddish brown, silty fine sands deposited by wind in dune forms. These are beneath the volcanic ash, and somewhat resemble the Kluane Silts. It is not known whether they are true loessal deposits laid down on a surface exposed by a drainage of Lake Champagne earlier than the supposed one, or whether they are merely lacustrine deposits that were leached and reworked by wind during Hypsithermal time. Their sand content and included evidence of human occupation indicate the latter.

The whole valley was now clear of water except for Kluane, Kloo, Pine, and other small lakes. The Dezadeash Valley floor began to be dissected, and the present drainage pattern was established. Dr. Sticht (1951; see also Denny, 1952) proposed that the retreat of the glaciers which drained Lake Champagne marked a major climatic event in post-glacial history, and was the beginning of the Hypsithermal, or warm period in this history. It reduced the mountain glaciers of the Coast Ranges to such an extent that their lower flood plains became inactive and covered with vegetation. Thus they could no longer produce enough loess to make noticeable additions to the deposits in the Shakwak and tributary valleys, and the surface of the deposits became stabilized except for the local reworking of already existing materials. There followed, then, a long period during which the leached profile of the Kluane Silts was formed, and during which the exposed surfaces of the lacustrine deposits in the Dezadeash Valley were also leached. Wherever we have found these ancient lake beds, even though they may be covered by a series of later lacustrine unleached silts, we have found them leached of carbonates to depths of 6 to 12 inches. The climate of the region during this time probably was at least a little warmer than at present.

At some time not long prior to the deposition of the volcanic ash the glaciers readvanced down their valleys and reactivated their lower flood plains. Clouds of dust again began to blow about in the interior valleys, and silt began to accumulate on the surface to form the gray Slims River deposits that we now see. At the same time the Alsek drainage was

effectively dammed again, and a great lake was formed in the western part of the Dezadeash and tributary valleys (Lake No. 3, Fig. 6). Its surface was at about 2, 120 feet (see Fig. 1). Had the Alaska Highway been in existence at that time a traveler going westward would have seen a narrow arm of the lake at the crossing of Marshall Creek, and would have been stopped by it in the vicinity of mile 1013 where there is a gravel beach.

This lake lasted long enough to accumulate at least 10-12 inches of fine-textured gray silt on its floor. The silt usually overlies an organic horizon one-fourth to one-half inch thick, and near the bottom of the silt there may or may not be a thin layer of volcanic ash. The ash at this level becomes the time marker which correlates the reappearance of lakes in the Dezadeash Valley with the renewed deposition of loess in the Kluane Lake basin. The gray silt is partially leached of carbonates, at least the marginal parts of it which have been longest exposed. It is the silt which appears at the top of the profile in Fig. 5c, and third from the top in Fig. 5b.

Altitudes used in the present paper for the old beaches and lake levels in the Dezadeash Valley were measured from bench mark elevations given on Map 1019A (Kindle, 1953). They were calculated from a series of many readings on a Paulin aneroid altimeter. Our field party camped for about a month at mile 1019, making many trips along the Highway between Champagne and Bear Creek, and using each occasion for observations of relative elevations on known beach lines and at other strategic points. The figures we are using are averages of these observations. Even so they must be regarded only as approximations.

Kindle described beaches in the lower Dezadeash Valley which he considered to be of recent origin, and which he thought marked the shores of a lake that he named Recent Lake Alsek (1953, p. 21-3). He drew an outline of this lake on his Map 1019A, presumably based upon observations of old shore lines. Judging by the position of the boundary drawn by him in localities known to us, his Recent Lake Alsek corresponds to the one we have described above as having had its shore lines at an altitude of about 2, 120 feet (Lake No. 3, Fig. 6). He traced arms of Recent Lake Alsek up Bear and Pine Creeks, and up the valley of the Dezadeash to about halfway between Marshall Creek and Aishihik River. He then noted a series of lower shore lines extending down nearly to the present level of the river where it enters the mountain gap. On a long talus slope at the foot of the mountain just west of the gap he counted no less than 36 beach ridges between the present water line and the top-most strand. These beaches are clearly visible from the north side of the valley above Bear Creek. He considered the beaches merely as "pauses" in the recession of Recent Lake Alsek. However, on the basis of differences in forest growth that he observed on the old beaches, he concluded that there had been at least one break in the drainage sequence of the lake, and that this probably represented at least one readvance of Lowell Glacier with the consequent damming of the Alsek River. He appears to

have considered it merely as a "stage" in the retreat of the lake rather than its complete drainage and partial refilling. He made an attempt to date later strand lines by means of spruce trees growing on them. He concluded tentatively, that the last phase of the lake ended about 100 years prior to 1950, and that beaches above his 2100-foot contour were built at some time prior to 1725. Thus he found an age differential of about 125 years between trees above and below his 2100-foot strand line.

Kindle's observations on the forests are valid, but his notes on altitudes for the lake beaches are difficult to interpret and to correlate with our own. In his discussion of the beaches on the talus west of the mountain gap (1953, p. 22) he gives the altitude of the highest one as 2, 240 feet, and the altitude of the river level as 1, 970 feet. Both of these figures are by aneroid. But there is a bench mark elevation on his Map 1019A, near Haines Junction, of 1, 956 feet, and an altitude at the Haines Road crossing of the Dezadeash River of 1, 930 feet. The latter is about 8 miles upstream from the base of the talus slope. No altitude is given along the river below this point, so that it is impossible with present knowledge to correct Kindle's barometric altitudes to make them agree with those of the map. Assuming, however, that on the talus he had a complete record of the Recent Alsek shores, the uppermost one should correspond to the beach we have placed at 2, 120 feet. This would involve a correction of about 120 feet, and place the level of the river, where it turns south, at about 1, 850 feet. It would require a rate of fall in the river between this point and the Haines Road of about 10 feet per mile.

Data from deep pits in the lower part of the valley (see Fig. 5b) indicate that Recent Lake Alsek was not one lake, but at least three. The first and largest, Lake No. 3, whose shore lines have been described above, was completely drained or nearly so, for the surface of its silt is covered with an organic horizon even in the lower parts of the valley. The mountain glaciers receded for a time, only to return and dam the Alsek again. This time the lake was considerably smaller, with its level at about 2, 040 feet (Lake No. 4, Fig. 6). Its shore lines are still clearly visible in many places, and it covered most of the country that is now occupied by the semi-open prairies of the lower Dezadeash Valley. Its gravel beaches are rather well defined all along the northern valley slopes. Near mile 1021, with materials derived from the Bear Creek Gravels, a large hooked spit was formed. Also in this vicinity the beach is often defined by long "windrows" of driftwood. Some 12-14 inches of gray silt settled in the bottom of this lake before it was drained by another opening of the Alsek Valley. This is the second silt from the top of the profile in Fig. 5b.

Another lake appeared not very long ago, or at least it disappeared not long ago (Lake No. 5, Fig. 6). It was smaller, and had its level at about 1, 970 feet. Evidence for it is clearly seen in gravel beaches, driftwood accumulations (Fig. 7b), and tree stumps still in place but battered by wave and ice action (Fig. 7c). There are ice-push ridges.

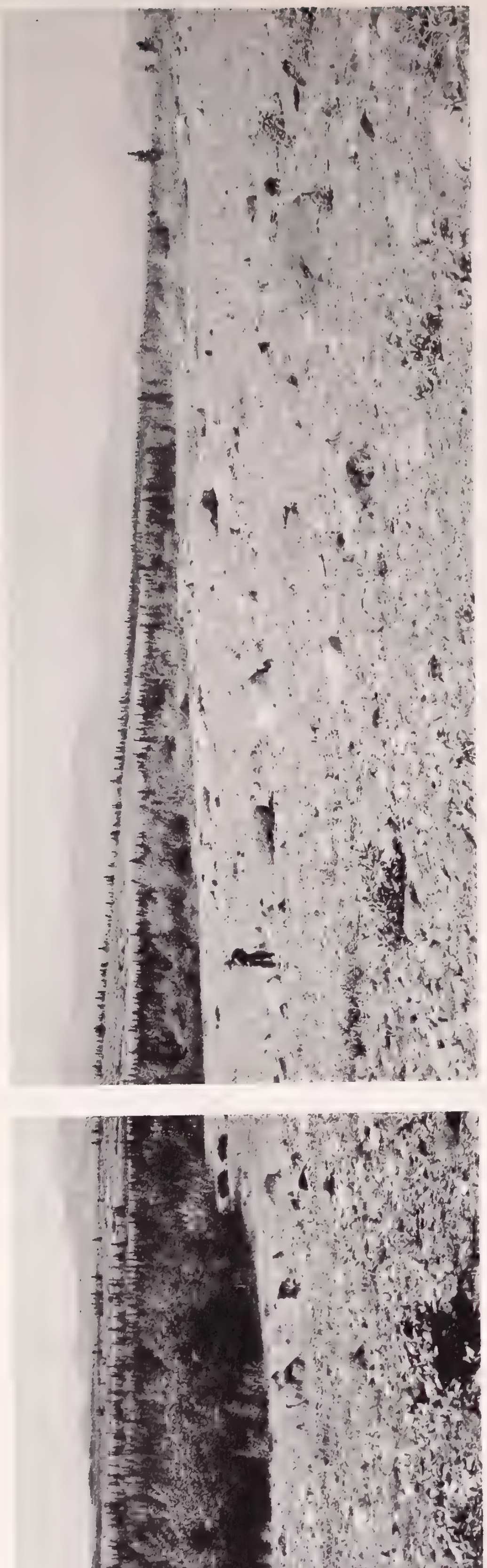


Fig. 7. Ancient lake beaches in the lower Dezadeash Valley. a. Ancient beaches, vicinity of Bear Creek, south of mile 1021, altitude about 2,040 feet (June 24, 1944). b. Driftwood marking ancient beach, vicinity of Bear Creek, south of mile 1021, altitude about 2,040 feet (June 23, 1944). c. Eroded stumps of trees in situ on ancient beach, vicinity of Bear Creek, altitude about 2,040 feet (June 14, 1948).

and a well-defined silt which overlies that of the last preceding lake. This silt is gray, slightly leached of carbonates and usually only 5 to 6 inches thick. It is the uppermost silt in Fig. 5b.

Kindle estimated that the last phase of his Recent Lake Alsek disappeared about 1850, and his altitude for it was approximately 2100 feet. When our proposed correction is subtracted from this the result is 1980 feet, an altitude within ten feet of that we have calculated for our Lake No. 5.

Word of mouth accounts of this lake are still current in the country. We found a story at the Canadian Department of Agriculture's Experimental Farm at mile 1019 which is apropos. A young Indian about 35 years old was sent to find a cache built many years before by his father on a knoll east of Pine Creek, on the shore of a lake. The son could not find the cache because a spruce forest had overgrown it, but Mr. Abbott, the Manager of the Farm, later came upon it in the proper place. The last of the lakes above mentioned probably covered most of the present site of the Experimental Farm, but knolls east of Pine Creek in this vicinity could well have been above it. Another story came from an old Indian woman, over eighty when interviewed in 1944. Her father, one "Wolverine John" remembered a lake in the vicinity of the present Bear Creek that extended eastward in the direction of Champagne, growing shallower in that direction.

If we are to judge by the behavior of the Recent Alsek Lakes, and through them the mountain glaciers that have formed them, the period since the close of the Hypsithermal saw first a relatively rapid and major enlargement of the valley glaciers, then a gradual retreat. The latter has consisted of a series of readvances, but the net result appears to have been retreat. Presumably the climate of the region was somewhat cooler than now during the early part of this period, but has been ameliorating to the present.

ARCHAEOLOGICAL STUDIES

ARCHAEOLOGICAL SITES IN THE KLUANE LAKE BASIN

The Little Arm Site

The Little Arm site has been designated JiVs-2 by MacNeish. This number originates in the system used to designate all Canadian Archaeological sites (Borden, 1952). A brief description of this system appears in MacNeish's monograph (this volume). The site is located on an old bench or terrace about eleven feet above high water. The terrace runs for several miles along the east side of the Brooks Arm of Kluane Lake (Figs. 8a; 9a).

The present surface of the terrace is rather dry and is covered with a vegetation which is recovering from grass and forest fires. Near the lake there are various grasses and willows. White spruce is thinly scattered over the terrace and some trees are established on the talus in front of it. The foehn winds which blow during the summer are commonly of gale force, frequently reaching an estimated velocity of fifty miles per hour in the gusts. The vegetation has held the surface of the terrace and serious erosion is seen only along its edge. Even the camps of recent Indians and fishing and hunting parties from Burwash Landing have not seriously modified the surface.

Erosion of the lip of the terrace is due partly to wind and, in a minor way, to water draining off the surface. Perhaps the most important present erosional agency is tunneling by an extraordinary number of ground squirrels. Collapsing of these tunnels results in breaking off of lumps of the silt which comprise the first two or more feet of the surficial deposits. Where unused ground squirrel tunnels have been uncovered in archaeological excavations they are found to be filled with the gray brown Slims River Silt and not with the reddish brown Kluane Silt.

The site is comprised of three sections or areas which are separated by wide shallow erosion channels. These channels lead down to a beach line which lies about five feet above the average lake level. This beach incidentally, is one of several which can be seen around the shores of the lake. Artifacts were found on the talus in front of the areas mentioned above extending for a mile or more north and south along the bank. We chose the central section in which to excavate contiguous trenches making a hole nine feet square. We layed out an extension of the first trench to cover an area three feet wide extending about twenty feet back from the edge of the bank. However, only two alternate squares of this were excavated before our food ran low and we had to return to Burwash Landing. Numerous small tests were made along some two hundred and fifty yards of the bank of this central section in places where artifacts or chips were found in situ in the undisturbed cross section of the Kluane Silt. Other similar tests were made along the edges of the northerly and southerly sections of the site. It was impossible for us to determine the extent of

Fig. 8. Air photos showing parts of Kluane Lake and locations of archaeological sites. a. Northwestern end of Kluane Lake; Brooks Arm in background. Arrow points to Little Arm site. The Duke River runs north in the left foreground to join Kluane River, the outlet of the lake. The fans of the Duke River occupy the lower half of the picture. The youngest fan is to the left, and the fans become progressively older toward the right. b. Central portion of the Lake showing the entrance to Talbot Arm. Arrow points to the Gladstone site located on Gladstone Creek. RCAF Photographs, 1943.

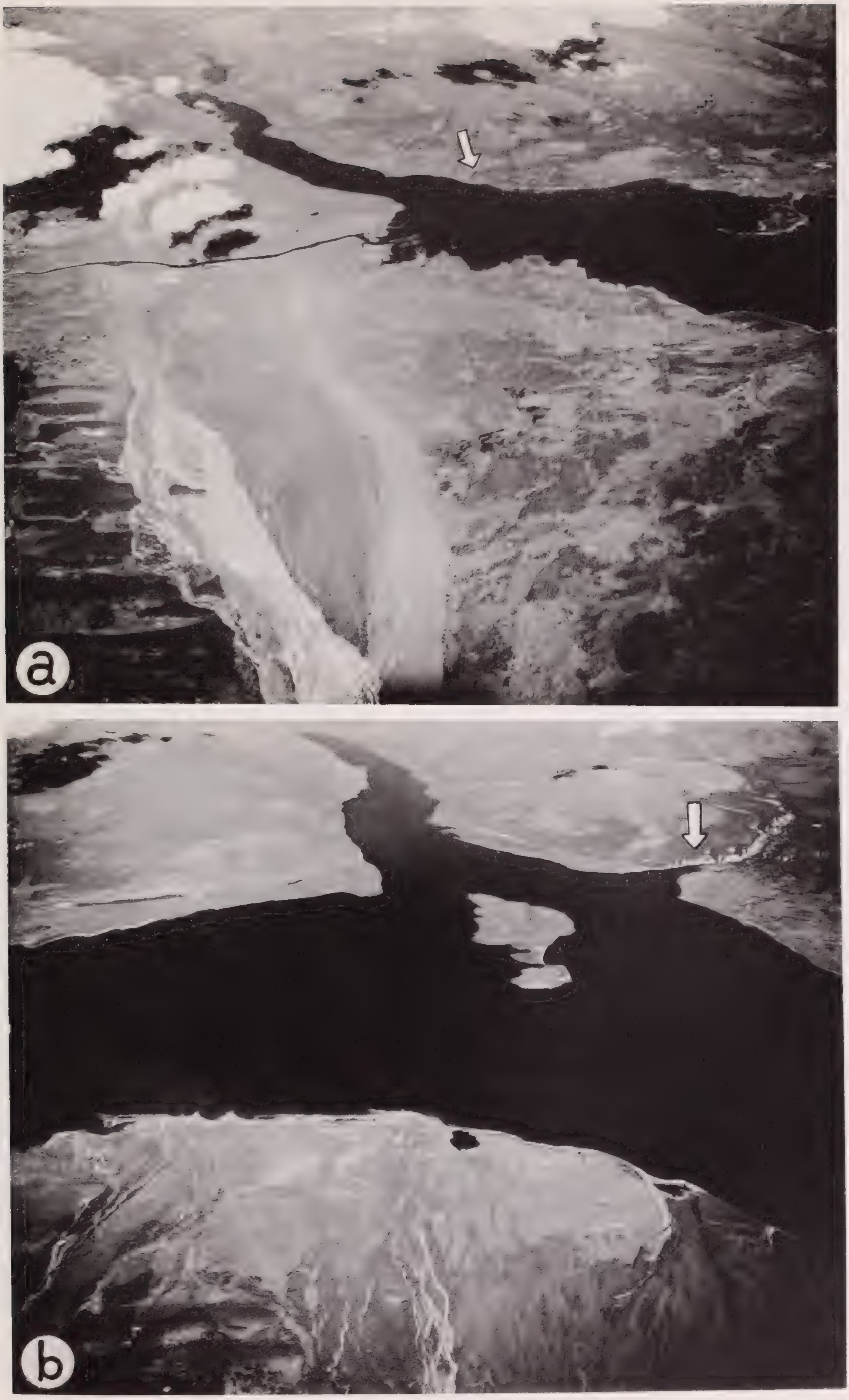

a
b

Fig. 9. a. The Little Arm site, view north. b. Little Arm site, view cross section, north wall, Trench 2. Remains of a stump may be seen in the left center of the cross section.


a


b

the site inland away from the shore. MacNeish's excavations in the southerly area of the site indicate that much of the terrace had been occupied.

Cross sections typical of our excavations are shown in Figs. 10a and b. The surface was made up of organic litter lying on a matted mass of tough roots. These grew in Slims River Silt. This combined organic and silt layer was three to five inches thick.

The Slims River Silt was underlain by a layer of volcanic ash which averaged about four inches thick. This ash is interrupted by lenses of "peat," by which is meant a compact mass of organic turfy material. The lenses were about one inch thick and measured from a foot or so to roughly ten feet, perhaps more, in diameter. To the south of the principal trench excavated there was an area where the ash appeared as a series of lenses sometimes but one foot long and one and one-half inches thick. These were surrounded by the turfy material which included a relatively large proportion of gray wind-blown sand resembling Slims River Silt.

In one cross section the remains of a small stump interrupted the ash layer (Fig. 9b). This is the remains of a tree whose roots penetrated the surface of the Kluane Silt. However, the wood was so badly decayed that positive determination of the location of the surface on which it started growth was not possible.

In all of the excavations at the Little Arm site a discontinuous and very thin layer of Slims River Silt separated the ash layer from the Kluane Silt. If Fig. 9b is inspected closely there may be seen a broken dark line. This is Slims River Silt lying just below the ash layer. Occasionally layers of turf separate the ash from the Kluane Silt.

The Kluane Silt averages a little more than thirty inches thick at this site. Initially the reddish brown, yellowish brown and light gray zones in the soil profile were measured. However, in the end, boundaries became so difficult to identify that precise measurement was abandoned. In places "tongues" of soil about two inches in diameter extended from the red to the yellow zone and from the yellow zone downward into the gray. In troweling a horizontal surface these "tongues" were cut off creating a mottled effect of red and yellow soil and to a lesser extent yellow and gray.

The upper portion of the Kluane Silt included so many fine roots, probably from grasses, that it was difficult to excavate. In addition to these living roots there were rotted roots of approximately the same size which had turned a very dark brown. In some areas, however, the reddish brown zone included small lenses of light colored material which resembled ash from thoroughly burned wood. These lenses included minute pieces of charcoal. Most of these were too small and soft to pick up, but rare pieces were large enough to identify certainly as wood. Whether or not these were the remains of burned roots was uncertain. About one foot below the surface of the Kluane Silt in one section there were two deposits of black material. One was about two inches in

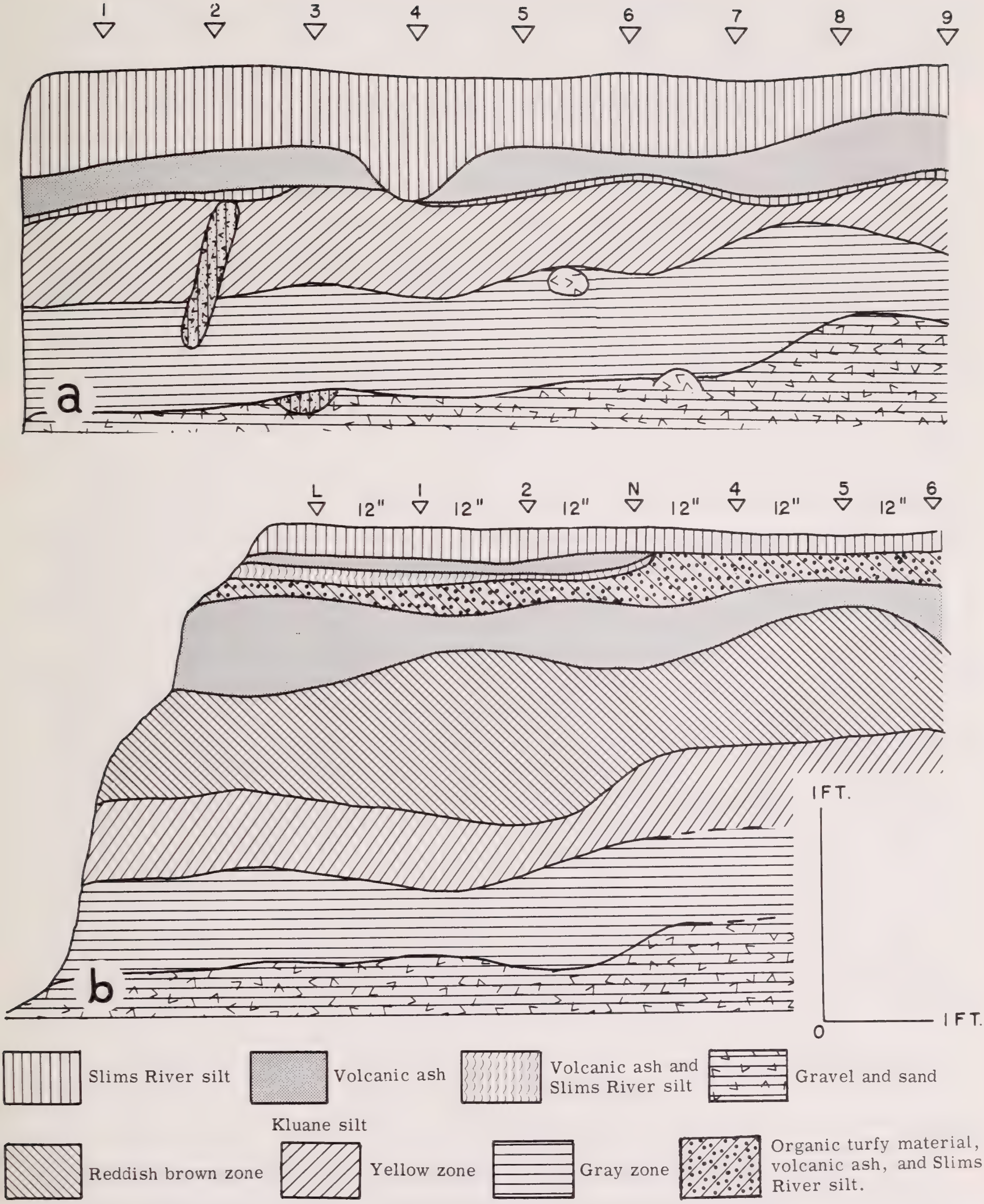


Fig. 10. a. Little Arm site, cross section north wall, Trench 2.
b. Cross section north wall, Trench 1.

diameter and was believed to be finely divided charcoal. The other little deposit was also about two inches in diameter and appeared as an irregular stain a foot or more long. This could be the remains of a decayed branch or root or a section of a ground squirrel tunnel.

The Kluane Silt included small rounded pebbles smaller than three-quarters of an inch in diameter. Whether or not these were wind polished was not recorded. Some of the pebbles had flat faces the surfaces of which were fresh as though they had been recently broken. The quantity and size of these increased with depth in the Kluane Silt.

The deposit underlying the Kluane Silt was described in the field notes as "gray fine sand and gravel." This referred to what was seen in the bottom of the excavations. The talus slope in front of the terrace was badly slumped and identification of the lowest deposits was not possible. One can only infer that the deposit was composed of gravel which was finer on the top than at the bottom. Almost certainly it was water-laid as were most of the gravels comprising similar benches in other sections of the lake shore.

Identifiable types of artifacts were scarce in the excavations, only five being found in situ. However, numerous very small chips such as would be made during the later part of the process of sharpening a stone tool by pressure flaking were found in every excavation. These and the excavated artifacts (Figs. 34, nos. 2, 7, 9, 12, 13) were found either on the surface or in the upper three inches of the Kluane Silt. Except for tiny flecks of charcoal which are not certain evidence of occupation we found no sign of occupation in the lower portion of the Kluane Silt. There were no artifacts or other evidence of occupation in the Slims River Silt except for readily identifiable modern remains on the surface.

Fig. 34, nos. 1, 3, 4, 5, 6, 8, 10, 11, were found on the surface of the sloping bank which led down from the surface of the terrace to the beach. The character of this beach may be seen in Fig. 9a. The upper limit of it is clearly defined by the position of the large stones. The surficial deposit on the slope between the edge of the terrace and the upper limit of the beach is Kluane Silt. In fact, the slope is reddish brown in color, nearly as dark as the upper zone of the silt. It is assumed that the artifacts have eroded out of the Kluane Silt. Such an assumption creates certain difficulties in classification. MacNeish holds that some of the tools we found belong to earlier horizons than others.

The Site at Mile 1085

Site 1085, located north of the Highway near this milepost, was discovered in the wind-blown materials located on a high bluff estimated to be about one hundred feet above the level of Kluane Lake (Figs. 11b; 12a). Part of the site had been exposed by a cut made for the pioneer road. Chips and some stone tools were found along the bank indicating that the site extended along the edge of the bluff for more than two hundred feet.

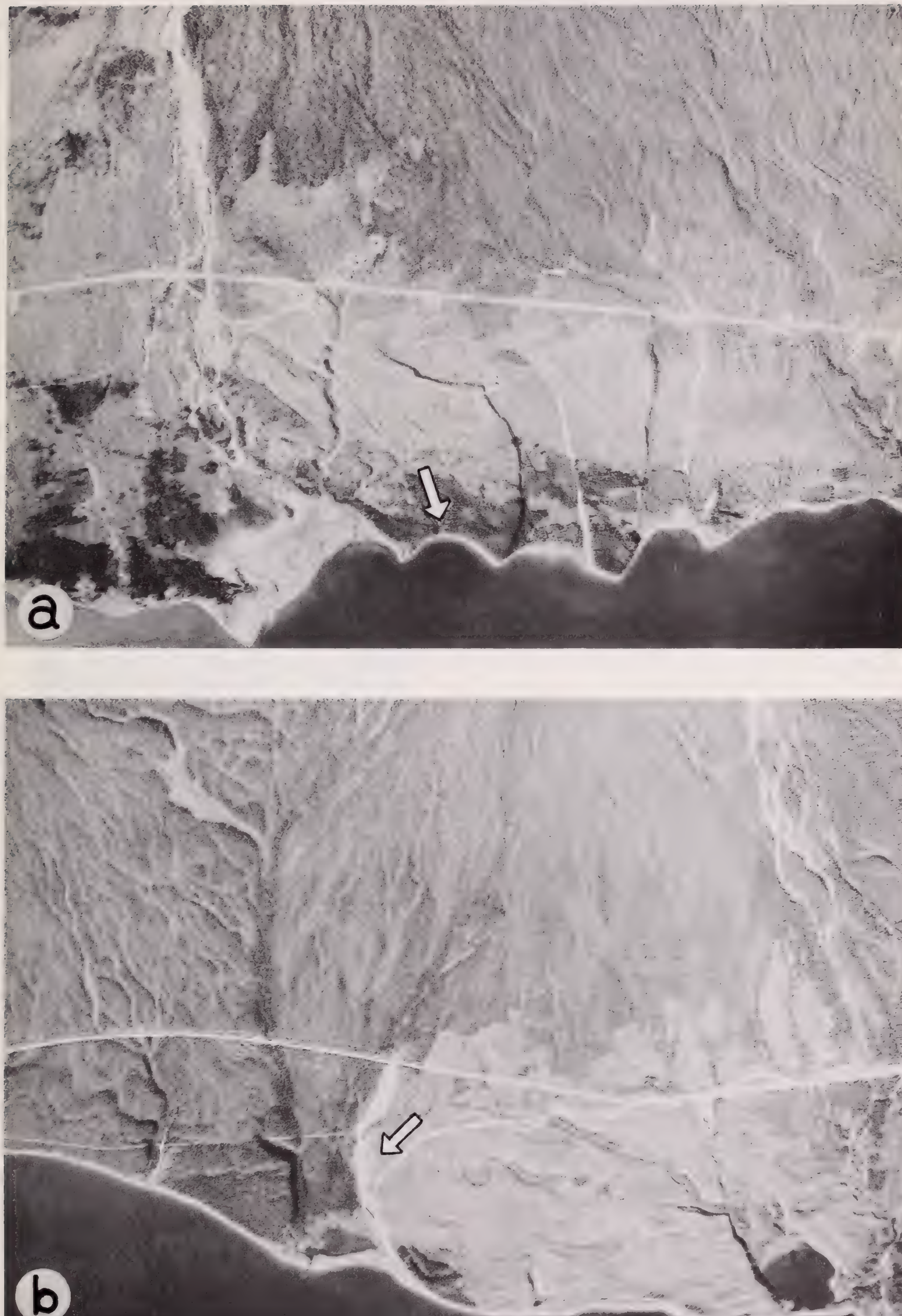
The basic deposit seen at the bottom of the bluff is a thick layer of water-laid gravel. It is poorly sorted and exhibits some bedding. On this lies a layer of till some ten feet thick. The till is quite fresh and includes boulders up to ten inches in diameter, rarely larger. The surface of the gravel supporting the till slopes gently upward to the north toward the lake. The surface of the till slopes gently downward in the same direction so that it pinches out and cannot be seen on the face of the bluff bordering the lake.

The bluff faces east, or more importantly, up the lake into the prevailing strong winds. As a result the surficial deposits are wind-blown soils which comprise a combination of locally derived sands and silts and the more widely distributed Kluane and Slims River Silts. The volcanic ash is also present.

The diagram (Fig. 13) shows the significant aspects of the situation as seen in several small excavations and a profile exposed by trimming the road cut for about 250 feet along the bluff. The Kluane Silt rests upon a coarse gray sand and is covered by a coarse wind-blown sand. The latter is also gray in color and includes small thin flat platy structures. A zone of occupation was located in the gray sand about thirty inches above the Kluane Silt. This occupied zone which was some twelve to twenty inches thick at its deepest part, was laminated, that is, ash and hearth layers alternated with wind-blown materials. The laminations are not clearly continuous,for pieces of charcoal and probably other results of occupation interrupt the distribution of the colored soils. The upper part of the occupied zone was composed of two clearly defined layers of ash, probably the remains of hearths. The uppermost was about four inches above the lower. It was these layers of ash which produced the majority of the tools and the considerable quantity of chips which were uncovered. The other tools and chips were found very near the layers. The excavations are not extensive but from the evidence collected it was estimated that the hearths responsible for the ash layers were roughly twenty feet in diameter.

Sites similar in their general characteristics were probably common in this vicinity. We found artifacts, for example Fig. 35, no. 4, on a site we numbered 1081 (Fig. 11a). This site and a number of others were exposed by erosion of the edges of high bluffs bordering ancient stream channels which were abandoned a long time ago. These channels flowed northward to Kluane Lake draining large outwash fans deposited against the mountain wall to the south. It is interesting to note that the sites may face east or west but none front on the lake as far as we could determine. Some of the chips we found were as much as a mile from the lake shore. As may be expected the sites on the eastern or windward edges of the bluffs are extremely difficult to find and not easy to interpret because the prevailing strong winds had disturbed the surface soils. The sites having some lee from these winds exhibit clearly the succession of Kluane and Slims River Silts and the volcanic ash which is the basic sequence in the undisturbed soils in the Kluane Lake basin.

Fig. 11. Air photos showing parts of the southwest shore of Kluane Lake, with locations of archaeological sites. a. Ancient creek channels and fans, with arrow pointing to site 1081. b. Old channels and fans with arrow pointing to site 1085. RCAF Photographs, 1943.


a
b


a
b
c

Fig. 12. Views of site locations on high bluffs along shore of Kluane Lake. a. Bluff in vicinity of mile 1085. Arrow shows location of site 1085. b. "Drowned" estuary of Christmas Creek; view east toward Talbot Arm. Arrow locates site on north bank. c. Bluff at mile 1074; view northwest. Arrow points to site on east bank of ancient creek.

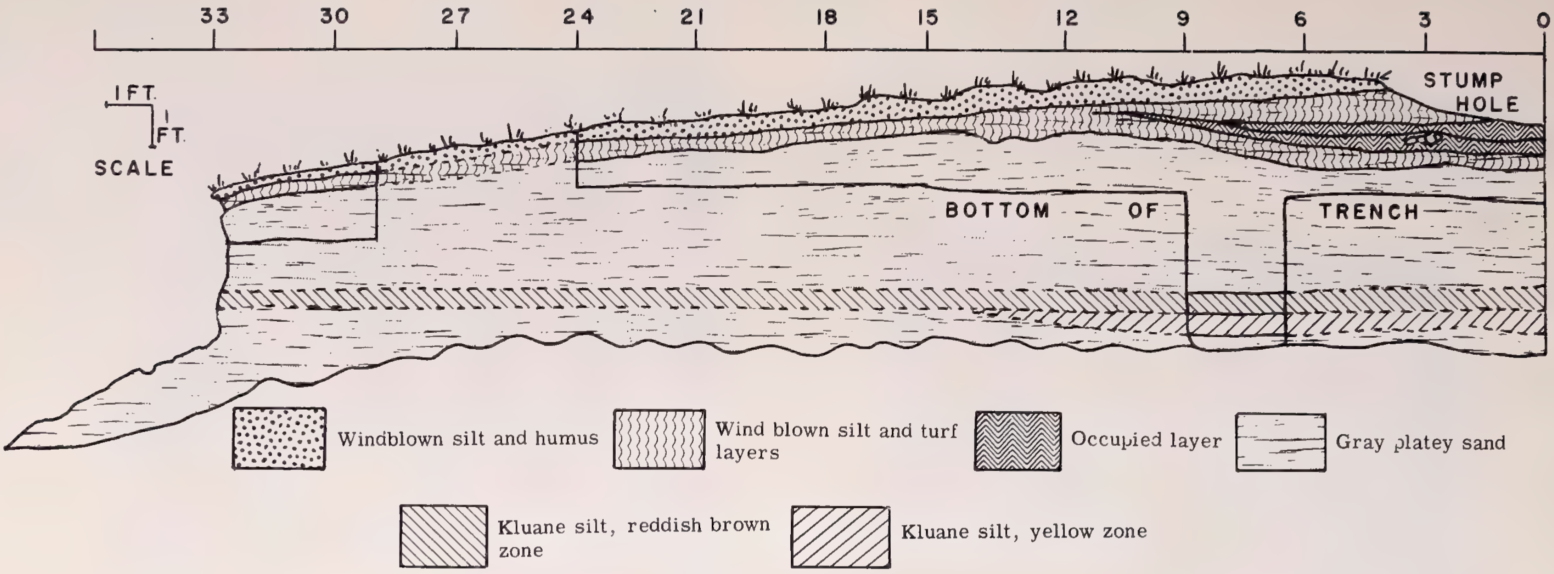


Fig. 13. Site 1085. Kluane Lake, cross section.

The Site at Mile 1074

Site 1074 is located on top of a terrace which rises ninety to one hundred feet above the level of Kluane Lake. Actual geographic boundaries of this site are difficult to establish because chips, burned stones probably from hearths, and artifacts are scattered over the surface of the terrace from the eastern end which would be at approximately mile 1073.5, west to beyond mile 1075. However, the area near mile 1074 we designate as the site for here was the greatest concentration of chips and artifacts. They were distributed over an area about one-half mile long east and west paralleling the Highway and perhaps one-quarter of a mile wide.

Where it meets the lake the bluff is the western boundary of an abandoned, ancient drainage channel formed by the run-off from the adjacent mountains (Figs. 14a, 12c). This abandoned broad channel ends in a small cove on the shore of the lake. A bar holds up a small pond just back from this cove. From here the channel leads westerly towards the mountains. For about one-half mile back from the lake the bottom of the stream channel slopes gently upward at about the same gradient as the surface of the terrace. The front of the terrace bordering the channel is a steep south-facing bank. The sloping floor of the channel is flat and at a point about one-half mile from the lake it is about 10 feet above lake level. Here there is a field of active soil polygons. This is evidence of frost action which probably is connected with the character of the basic soils and the drainage in the channel. Above these polygons there are a number of boulders which may be the outcropping of bedrock or simply the result of erosion of the underlying till. At any rate, from here the grade of the valley floor rises sharply, and near mile 1075 lies approximately at the level of the terrace. In this vicinity the topography is complicated by a number of small eskers. It is possible that a recent unnamed creek (Fig. 14a), which is dry except during infrequent periods of rainfall or when mountain snow and ice are melting, is the descendant of the ancient stream running in a new channel.

We found artifacts in the vicinity of 1075 and MacNeish reports some excavation there. However, the major portion of our collection came largely from the area south of the Highway near 1074 and to the east. Chips and a few artifacts, and the cache to be described, were found immediately north of the Highway on a surface exposed by road building operations. Farther north, between the Highway and the lake, conditions were quite similar to site 1085 except that no artifacts were found.

This area had been burned over a number of years prior to 1944. The fire in the forest had weakened the ground cover and except for scattered areas three to ten feet in diameter the soils had been blown out. The blowouts exposed and eroded the reddish brown zone of the Kluane Silt. We saw no place where erosion had removed this entirely, exposing the yellow. Wind action was responsible for a loose layer of silt which was generally reddish brown in color and mixed with dried leaves, twigs and the like. This layer was being blown about by the winds, being constantly in motion. Many artifacts were found on and in this loose material. The soils in areas which had been grassy openings in the forest were not affected by the fire. This includes the steeply sloping bank and an area some ten yards wide and about two hundred feet long along the edge of the terrace. The area north of the road had not been seriously burned.

Excavations in undisturbed sections were necessarily limited. However, a cross section was recorded for the site (Fig. 15). The sequence of soils was invariably the same in each place. The underlying deposit was till on which lay a stratum of gravel, probably water laid, two to three feet thick. The gravel was covered by the Kluane Silt which varied in thickness from one to two feet. In some sections the Kluane Silt was overlaid by a layer of gray wind-blown sand. This is similar to that found at Site 1085 and is probably of similar origin. The sand layer is only a few inches thick at site 1074. Volcanic ash and Slims River Silt, the latter being the uppermost deposit, complete the section.

Unfortunately, no artifacts except those in the cache were found in situ and so there will always be some uncertainty concerning the provenience in the section of the artifacts we picked up. The observations we made and the evidence from the excavations strongly suggest that the level of occupation lay in the red zone of the Kluane Silt. This was the only level which produced chips, the remains of the stone industry. The gray layer above the Kluane Silt could have been occupied. However, in the exposure we saw there were no chips or other evidence of human occupation and so we infer with some confidence that the tools came from the red zone of the Kluane Silt.

The cache of artifacts, pieces of obsidian, etc. (Fig. 41, nos. 1-16) was found on a surface exposed by construction operations a few feet north of the road. In this area bulldozers had removed the Slims River Silt, volcanic ash and perhaps a few inches of the top of the red zone of the Kluane Silt. Subsequent wind erosion had cleaned the surface and exposed the arrowpoint (Fig. 41, no. 1) and a number of retouched flakes.

Fig. 14. Air photos showing parts of the southwest shore of Kluane Lake, with locations of archaeological sites. a. Ancient creek bed and an area of small eskers near mile 1075. The arrow locates site 1074. b. Burwash Landing and vicinity. Arrows locate sites. Site No. 4 is located practically among the houses of the trading post. RCAF Photographs, 1943.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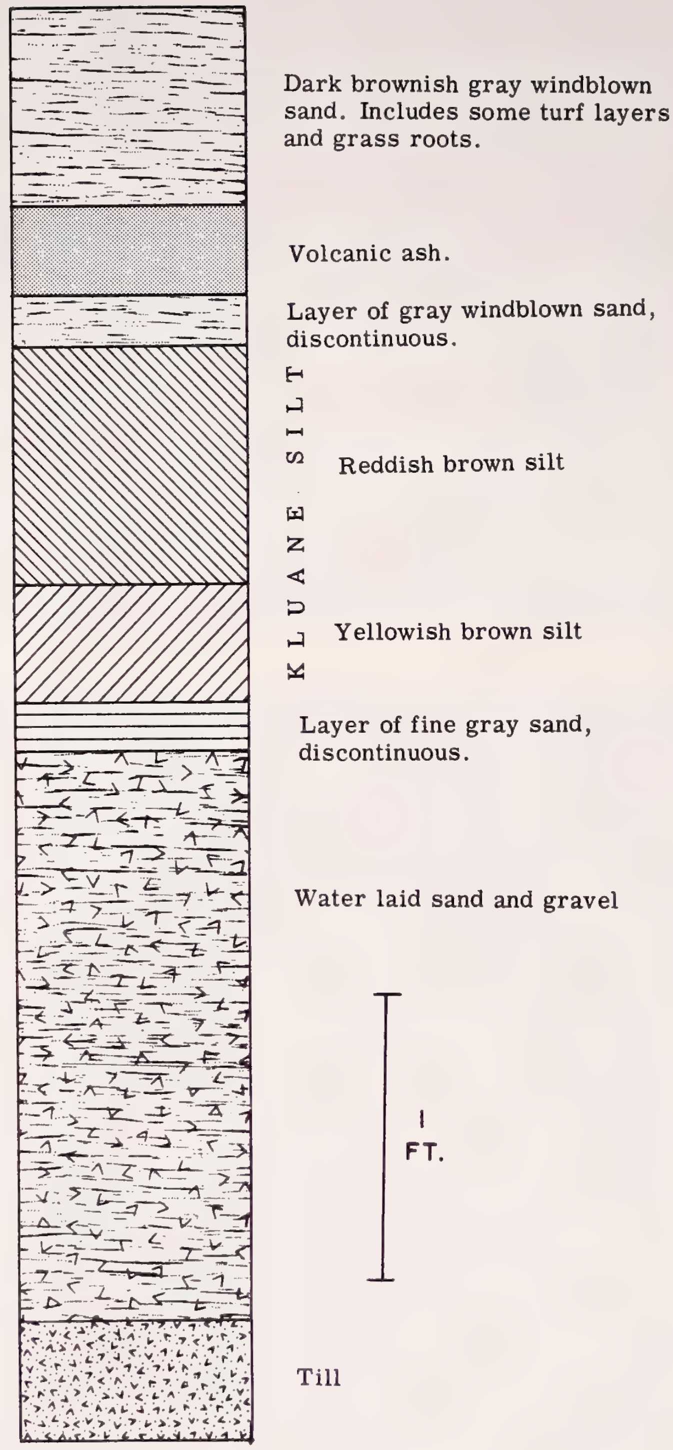


Fig. 15. Cross section of archaeological site 1074. This is a composite diagram based on cross sections recorded in various areas of the site.

Upon removing the litter and the loose soil, it was found that a few flakes were not in situ. The other specimens lay on a deposit of wood ash containing flecks of charcoal. This was surrounded by the red Kluane Silt. Small pieces of charcoal were distributed in this silt over an area roughly two feet in diameter. One very small piece of bone disintegrated immediately upon exposure. It appears likely that the deposit was originally a small fire. The artifacts were not burned but placed on the ashes and possibly covered. Alternatively this may have been a deposit in a small pit. The depth of the deposit from the original, or present surface cannot be determined.

MacNeish has told us that he found a small eroded area back from the bank which could be excavated. He found in situ in the upper red zone of the Kluane Silt micro-blades, side notched points, end scrapers, side scrapers and one spoke-shave. These belong to his Taye Lake Complex. It is important to note that the arrowpoints we found in other sections of the site are earlier in MacNeish's scheme than the Taye Lake Complex. In view of this distribution of points in several complexes there is the possibility of occupation over a long period of time. The question can also be raised concerning the location of artifacts of the Taye Lake Complex. MacNeish finds them only in the lower part of the Slims River Silt (Table 3). There is the suggestion at this site that they could be earlier, originating in the reddish brown zone of the Kluane Silt. However, the number of artifacts and the information concerning them is insufficient to be significant.

The Christmas Creek Site

Christmas Creek is one of the small streams which drain the height of land separating the Kluane Lake basin from the Alsek Valley (Fig. 1). The mouth of the creek is at the head of a steep sided estuary about one mile long and one-quarter of a mile wide located on the east side of the southern end of the lake. This estuary runs southeasterly from the lake. The southern bank is in a lee from the prevailing Slims River winds. Here the profile appears to be characteristic of the region; that is, Kluane Silt resting on gravels or till. These are covered by the volcanic ash and Slims River Silt. Along the shore of this area, which is between the Highway and the Creek, chips were found eroding out of the Kluane Silt. One side scraper (Fig. 36, no. 5) came from the red zone of the Kluane Silt.

The north bank is much steeper than the opposite one (Fig. 12b). It is exposed to the Slims River winds especially on the outer end near the lake. As a result the surficial deposits are extensively modified. The surface is largely covered with dunes made up of the silts, volcanic ash, and local sands. Nevertheless, an underlying deposit of Kluane Silt can be easily identified. Near the end of the bluff a clean profile of the Kluane and Slims River Silts was exposed for a distance of about two hundred

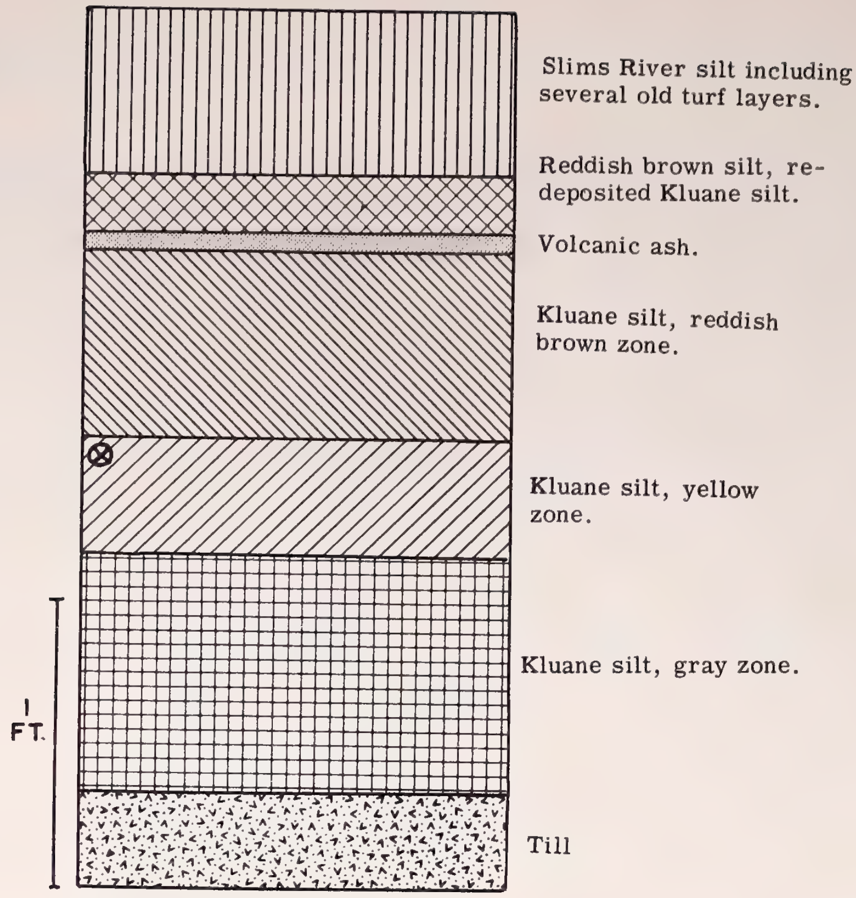


Fig. 16. Cross section of archaeological site on top of bluff at Christmas Creek. Circle indicates location of chopper.

feet. Here clearly in the yellow zone of the Kluane Silt a chopper (Fig. 36, no. 9) was found in situ (Fig. 16). This chopper is interesting for it belongs in what MacNeish calls the "Kluane Complex," the oldest evidence of occupation in the region.

Sites at Gladstone

Gladstone Creek runs into a small bay at the mouth of the Talbot Arm on the northeastern side of Kluane Lake. (Fig. 8b). The bluffs that margin the north shore of the bay are of till which seems to be well cemented for it is weathering out into vertical faces and castellated structures (Fig. 17a). The bluff has a vertical or slightly overhanging face of till about fifty feet high. On most of this exposure there is a thick mantle of Kluane and Slims River Silt much of which is undisturbed and lies in the order typical of the region, the two silts being separated by the volcanic ash. Some sections of Kluane Silt were three to four feet thick. There were a few places where the silts had been reworked by the wind so that reddish soils appeared above the ash or above the uniform deposit of silt. A similar exposure was described in this vicinity by Bostock (1952, p. 36).

Evidence of wind erosion was everywhere. A profile recorded in Fig. 18a shows the truncation of the Kluane Silt on the edge of the bluff. This was clearly thinned out by the wind after the soil profile had developed, for the red layer thins out to nothing toward the edge of the bluff under which are the yellow and finally the gray zones.

In another place a layer of water-laid small gravel and layers of silty peat had been deposited over the Kluane Silt (Fig. 18b). This is in the bed of an old stream which later developed a muskeg with fresh water shells in it (Fig. 18c). The volcanic ash was deposited in the muskeg, and later the whole was finally covered with Slims River Silt which now supports a forest.

During part of the one day spent on this bluff a number of artifacts were collected (Fig. 36, nos. 1-4, 6-8, 10). Though some were on the surface they could only have come from the reddish brown zone of the Kluane Silt. A few small chips picked up on the gray Slims River Silt could easily have been blown there. The very top of the highest bluff was particularly rich in material. There two beds of chips were found in the reddish brown zone. Nearby there were several other chips, some artifacts, small deposits of burned bone, and the remains of a hearth. All the latter were in situ also in the reddish brown zone of the Kluane Silt. Fortunately, MacNeish was able to return to this site to find a group of "Gladstone Artifacts" in the reddish brown zone and the significant "Kluane Culture" in the gray zone.

The Sites Near Burwash Landing

In the vicinity of Burwash Landing artifacts were found on the surface in five localities (Fig. 14b). A trench was excavated in 1948 at the site we designated Burwash 3, later to be numbered by MacNeish as JiVs-6. Our Burwash 4 was renumbered JiVs-3. The other three sites were not found by MacNeish.

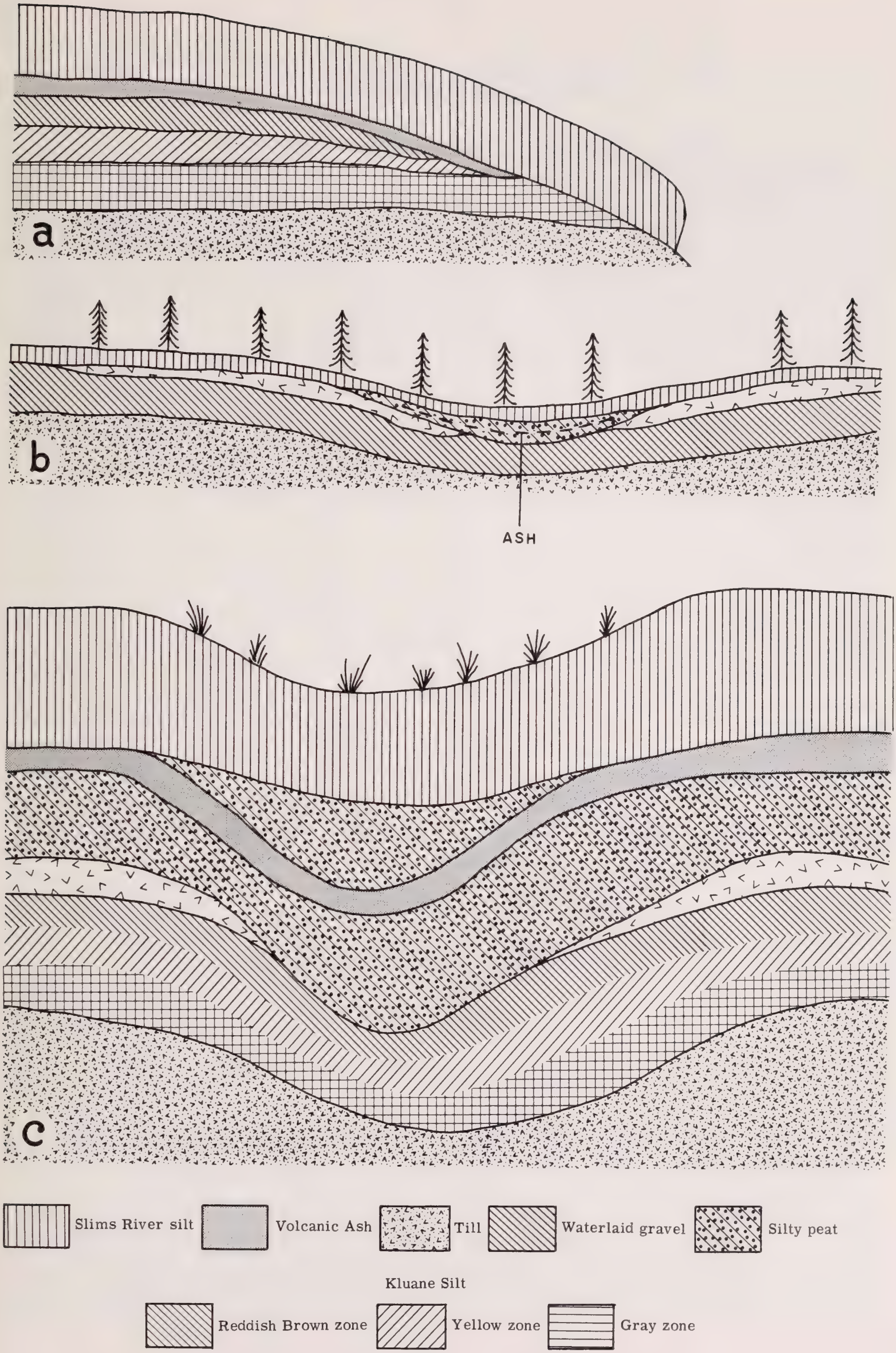
The trench at Burwash 3 served a variety of purposes. At the time of the discovery of the site the expedition was deeply involved in the final stages of the investigation of the development of the silts, the distribution of the forests, and so on. These ideas are set forth in another section of this monograph. Burwash 3 was first located in an area where the surficial deposits had been blown out. Excavation of the trench brought to light evidence of a forest fire which turned out to be rather widespread in the locality (Fig. 17b). Suppression of tree rings in nearby trees dates the burn to about 1900 A.D. Beneath the burned area there lay a large hearth. This was included in the Slims River Silt above the volcanic ash. Various artifacts (Fig. 42, nos. 4, 6, 7), some small animal bones and numerous chips were found in the Slims River Silt in association with this hearth. There was no evidence of occupation in the Kluane Silt.

The other four sites at Burwash were not excavated. The artifacts illustrated (Fig. 42) were found on the surface and their provenience and association is not known.

Fig. 17. Gladstone, Burwash, and Mountain archaeological sites. a. North bank of "drowned" estuary of Gladstone Creek. The archaeological site is located in the bank where the figures are standing. b. Cross section of site Burwash 3. c. Site of discovery of Lerma-like point (Fig. 42, no. 8) near or immediately above tree-line on an unglaciated mountain top which is part of the divide between the drainage of the Ptarmigan Heart Valley into the Nisling River, and the drainage of Talbot Creek into Kluane Lake.


a
b
c

Fig. 18. Cross sections of Gladstone site, north bank of estuary of Gladstone Creek, Kluane Lake. a. Cross section showing truncation of Kluane Silt on edge of bluff. b. Cross section showing waterlaid gravel and silty peat including the volcanic ash layer, all of which are in the bed of an old stream that ran on Kluane Silt. c. Cross section showing two layers of silty peat separated by a volcanic ash layer lying on Kluane Silt.


a
b
ASH
c
Slims River silt
Volcanic Ash
Till
Waterlaid gravel
Silty peat
Kluane Silt
Reddish Brown zone
Yellow zone
Gray zone

A Mountain Archaeological Site

There is nothing definitive to say about the site of the discovery of the Lerma-like point (Fig. 42, no. 8) on a mountain top north of Kluane Lake. The point was lying on the surface among small pebbles and boulders included in a reddish soil. This was one of the infrequent bare spots on the top of the mountain. The altitude was approximately at tree line and the surface was above the limit of glaciation. As noted in the title of the illustration (Fig. 17c) the mountain top is part of the divide between the Ptarmigan Heart Valley and the valley of a northern tributary to Talbot Creek. An unnamed stream in the Ptarmigan Heart Valley flows eastward into the Nisling River, an eastern tributary of the Donjek. This locality is not indicated on the map shown in Fig. 1. However, it is in the incompletely mapped territory northeast of the head of Talbot Arm of Kluane Lake. A manuscript map available to us gives its approximate position as Long. 139° 37' W and Lat. 61° 47' N.

ARCHAEOLOGICAL RECONNAISANCE IN THE DEZADEASH VALLEY

It was impossible to locate archaeological sites in the Dezadeash Valley until notions could be evolved concerning the succession of lakes which had periodically filled the valley. A diligent archaeological search paralleled by geological study eventually led up the sloping floor of the valley to the ancient lake beach which lies at an altitude of about 2, 120 feet above sea level. This beach crosses the Alaska Highway near mile 1013, and the site we designated by this number was found in silty sands lying a few feet above it. All ancient sites, that is sites producing artifacts belonging to the Little Arm, Champagne and Gladstone complexes identified by MacNeish, were found above the level of this beach. If they existed at lower levels they were covered by lake silts and have not been exposed as far as we could discover.

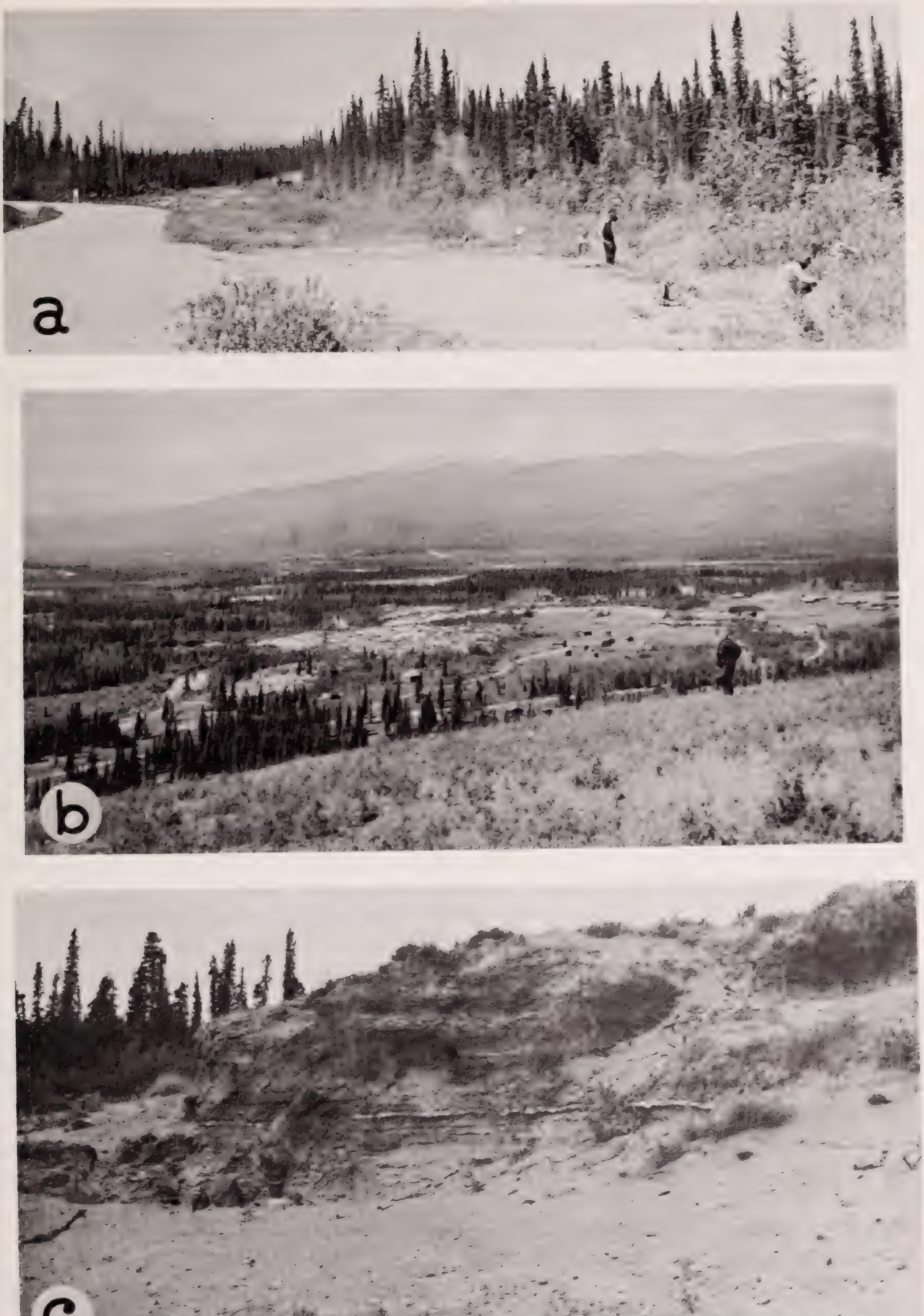
The Taye Lake and Aishihik complexes have been identified at the Champagne and Canyon sites to be described below. These sites are both above the level of 2, 120 feet. However, there were a few localities below this level which produced a few non-diagnostic artifacts. The presumption is that the artifacts are probably to be associated with the Taye Lake and Aishihik complexes. However, lacking adequate information concerning provenience and associated types we can make no definite decision. One such locality was found on the "Pioneer Road" east of the junction of the Highway and the Haines Road. This site is in an area of much slumping and the few chips seen were not in situ. A comparable situation was noted on a knoll bordering the Highway a short distance east of Pine Creek. A scraper and a few chips of dubious origin were found in an area severely disturbed by congeliturbation. It could not be determined whether these artifacts had been moved down slope or whether they had been brought to the surface from some ancient buried camp site. Such discoveries throw very little or no doubt on the conclusion that ancient sites are to be found exposed only above the altitude of about 2, 120 feet. If any lie below this altitude they have been buried by deposits in the lake which is responsible for this beach and by the silts of subsequent lakes.

The Site at Mile 1013

The site of major interest was originally numbered 1013 and has been renumbered JeVi-1. In 1944 and again in 1948 numerous artifacts were found on the surface exposed during road building operations (Fig. 19a). The 1948 excavations produced no tools. The level of occupation was positively identified by the location of chips.

The surficial deposit was a reddish silty sand which lay upon a gray clay the surface of which was very uneven. The chips were found from

Fig. 19. The Dezadeash Valley, and archaeological sites at mile 1013 and Champagne. _a_. Site 1013. People on the right are excavating in smudges to ward off mosquitoes (June 13, 1948). _b_. Dezadeash River valley: view northwest from top of Champagne moraine. Part of the village of Champagne may be seen in the right center of the picture. The dunes mentioned in the text border the river, which is partly hidden in them to the left. The sites excavated were in the left center of the dune area. Natural grassland on moraine in foreground (June 23, 1948). _c_. Part of site at Champagne 2 before excavation. The many turf layers show as dark streaks, and the light streak is the volcanic ash layer. Chips and artifacts lie on surface of the blow out. Excavation was to the right, outside this picture.


a
b
c

two and one-half to six inches below the surface of the silty sand. There was some charcoal in this silt. In the upper part of the section the charcoal was solid and somewhat brittle. In the lower levels very soft "mushy" deposits appeared to be charcoal. Separate pieces of the charcoal could have been remains of aboriginal fires. These were easily distinguishable from oxidized roots.

The Sites at Champagne

Apparently an area extending a number of miles along the Dezadeash River and including the site of the present village of Champagne, has been occupied in one way or another at least since the beginning of Hypsithermal time. Chips are found widely scattered in the village, along the road which leads southeasterly to the Dezadeash River, and along the river for a distance of at least three miles. A number of chips and some tools (Fig. 40, nos. 17, 21) were found on top of the large Champagne moraine which is such a prominent feature of the landscape (Fig. 4b). The location of all these artifacts, from several characteristic locations, requires careful consideration because the floor of the valley has been subject to frequent severe and extensive wind erosion and deposition, since the disappearance of Glacial Lake Champagne (Kindle, 1953, p. 15). The area is characterized by a succession of dunes and blowouts (Fig. 19b).

Because of the widespread distribution of archaeological materials it was desirable to reconstruct a sequence of events in the region and a profile in which the vertical location of the evidence of occupation might be located. Ancient dunes can be identified in many parts of the area. These are usually covered with a sparse vegetation growing in recently deposited sands. Beneath these recent sands there is a thin layer of volcanic ash. Below the ash, in a fine gray sand there are various layers of concentrated organic materials and frequently evidence of developing soil profiles. Stages in the development of the dunes can also be seen in the succession of tree stumps. In the underlying clay, stumps are rare but large rotted roots are found in "tubes" of calcium carbonate. Above this, in the upper layers of the old dunes, stumps are identifiable though badly decayed. Tree stumps in the upper zone, or on surfaces of the modern dunes, are in much better condition.

The Champagne moraine appears to be capped by some of the older silt which has been reworked by the wind. In suitable places a surficial deposit of fine grained soil has an upper dark reddish brown zone four to six inches thick. In this there are pockets of volcanic ash. Below, a light reddish soil and a gray soil are two to six inches thick. This lies upon the gravel and till which comprise the moraine.

Modern dunes, that is, those formed subsequent to the ash fall, vary greatly in their characteristics. Some are partially stabilized supporting varying kinds of vegetation. Others are practically bare and are being

moved by the wind at the present time. These modern dunes are concentrated in a zone bordering the river. Characteristically they have moved in a generally northerly direction over the older dunes. The surface of the latter can be identified to leeward, or to the north, of the modern dunes. Along the windward face the wind has frequently cut into the older dunes so that the cross section is exposed to varying depths. It was in such areas that the principal Champagne sites were found. Sites numbered Champagne 1, 2, and 3, occupied contiguous blowouts spreading nearly one-half mile along the north bank of the river. The stratum in which the artifacts were found was followed for about three miles. Evidence of occupation was found in many of the exposures but it was not concentrated as it was at the "sites."

One of the characteristics of the levels of occupation at these Champagne sites was the presence of "chip beds." Hundreds, if not thousands, of chips were packed tightly together in areas which varied from two to six feet in diameter. The beds averaged less than two inches thick. The chips were usually from one kind of stone but occasionally several types were represented. The somewhat tedious and unrewarding task of removing these chips one by one from a number of these beds failed to produce a single identifiable tool, nor did careful inspection of the chips reveal any signs of retouch or of use.

Basic deposits in the region were water-laid clays and sands. The channel of the river was incised into these deposits. The flat surface of the basic deposits supports three layers of sands. Cross sections in two places at Champagne 1 are typical (Fig. 20a, and b). Stratum No. 1, the lowest layer, is comprised of coarse gray sand which is bedded and probably water-laid. The top of this, in one place, was sixty-six and one-half inches below a modern surface and at another location thirty-seven and one-quarter inches below a surface which was being eroded by wind action.

Stratum No. 2 was comprised of fine gray wind-blown sand. At the bottom the gray sand included spots of reddish sand and could possibly be an old surface lying on Stratum No. 1. Stratum No. 2, which varied from about thirty to nearly fifty inches thick, included in its fine gray sand large lenses of organic material about two inches thick. These were named "turf layers." Some turf layers were comprised of matted grass or other similar roots. Others were concentrations of more completely decayed organic materials. We believe that these layers are remains of ancient surfaces and represent periods when that particular area of the dune was a surface exposed and stabilized for a length of time which permitted vegetation to grow and, upon occasion, human occupation to flourish. No turf layer which was continuous, covering the entire area, could be identified. However, study of the exposures along the river bank and at other places indicated that a turf layer, or better a zone of turf layers six or eight inches thick, might extend over an area one-quarter to one-half mile in diameter.

Stratum No. 2 varies in depth and content in the three miles it was

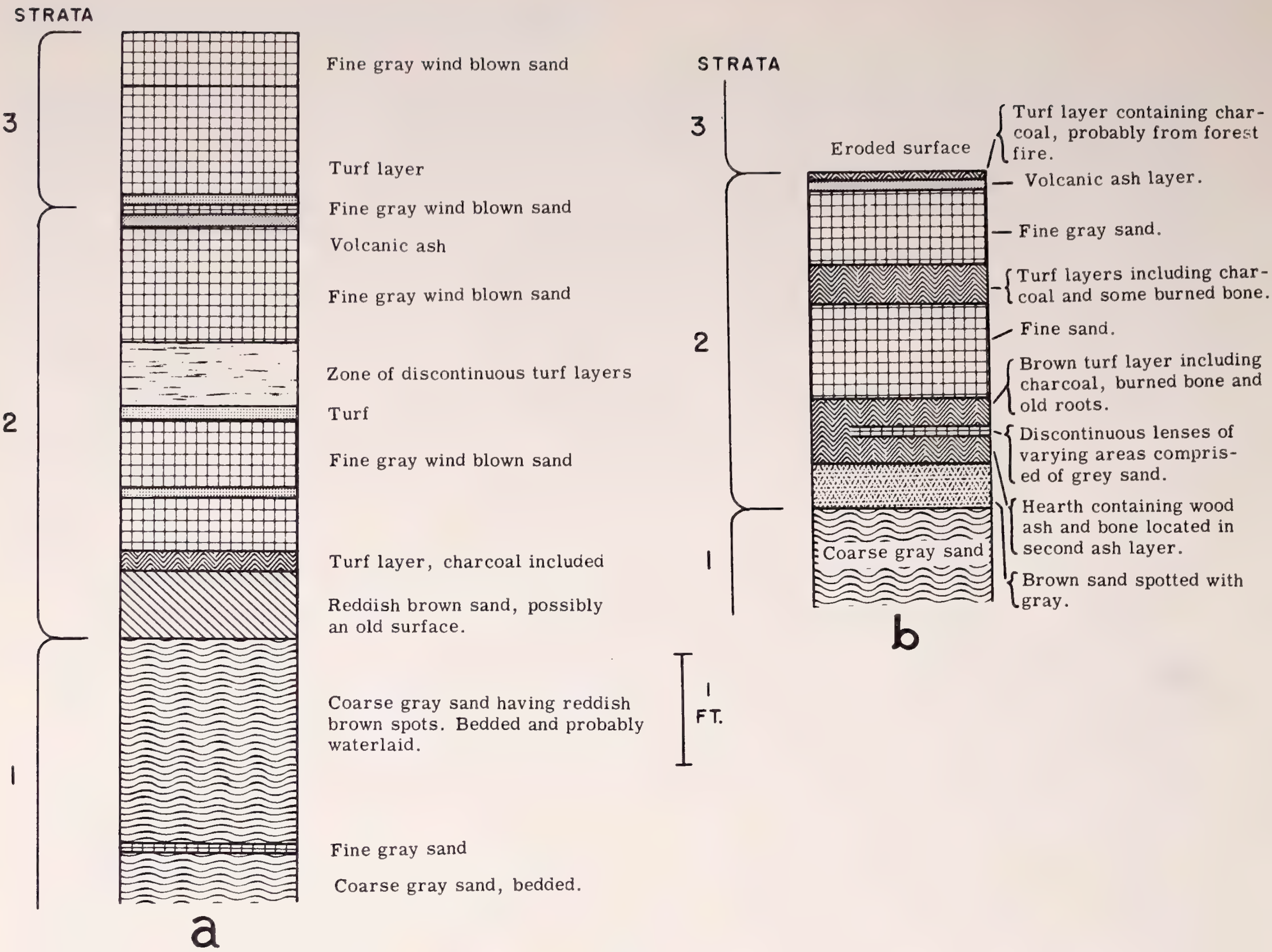


Fig. 20. Site Champagne 1. a. Cross section west side, section A. b. Cross section, section B.

followed along the river bank. In some sections the layer is thin and all of it includes organic remains. In other sections Stratum No. 2 may be absent. Where present, the surface upon which the volcanic ash was laid down can be smooth and flat or very irregular.

Stratum No. 2 is quite certainly of aeolian origin as the above description shows. The principle difference between the dunes of Stratum No. 2 and the modern ones is that the former are much smaller and also they include the turf layers. These are much less frequent, less extensive and very poorly developed in the modern deposits. The modern dunes do not exhibit the incipient soil profiles which have developed in association with the turf layers in the older dunes.

Stratum No. 3, essentially the modern dune, is separated from Stratum No. 2 by a turf layer and the volcanic ash. The stratum is composed of gray fine wind-blown sand and varies greatly in thickness. If the surface is not active it is covered with vegetation consisting of grasses, small shrubs and rare white spruce trees.

When discovered Champagne 3 was a large blowout located on a ninety degree bend, one of the meanders of the Dezadeash River. The blowout was about one hundred yards wide along the river. The edge of

the blowout along the river bank was about twenty feet above the level of the water. From this bank the surface sloped upward, to leeward, in a northerly direction to the crest of the modern dune, a distance varying from two yards where it was very steep to more than twenty yards.

At the river bank the wind had exposed the coarse gray sand of Stratum No. 1. The upward sloping surface cut across and exposed all of Stratum No. 2. This surface was marked by small inconspicuous scarps formed by truncation of turf layers and finally by a prominent scarp, the volcanic ash layer. The stumps mentioned above and layers of organic matter representing six or more very poorly defined vegetational horizons could be seen. About three were in the upper sections of Stratum No. 2 and the others were above the layer of volcanic ash.

The surface of the blowout below the outcropping of the volcanic ash layer was littered with innumerable chips among which were a few stone tools (Fig. 40). In view of the fact that no tools or chips or other evidence of human occupation were found above the volcanic ash during all our investigations in this area we assume that the artifacts were associated with levels in Stratum No. 2.

Of the two hearths discovered, the eastern one lay twenty-nine and one-half inches below the exposed surface in Stratum No. 2. The hearth was an area about two feet in diameter which had been baked hard. It was redder than the rest of the layer and it contained ash and small fragments of burned bone. Above the hearth was a layer of yellow-red sand topped by a turf layer containing a quantity of bone. The bone was very soft and could not be saved. Above this was a layer of reddish sand and a third turf layer. This contained a large quantity of charcoal and showed signs of considerable burning. There were some flecks of burned bone in it. Despite lack of stone tools and chips it is assumed that this zone had been occupied.

A trench was excavated in the western section of the site. This commenced where the lower part of Stratum No. 2 was exposed and led toward the bank under the layer of volcanic ash. A second hearth was found here. This hearth comprised the remains of a series of fires which had been built on the red sand, the lowest member of Stratum No. 2 (Fig. 21). The fires had been built one on top of the other and they may represent repeated occupation of the area separated by varying lengths of time. One scraper (Fig. 40, no. 9), and one retouched flake, the only tools found in the trench, were in this hearth. There were numerous chips and fragments of burned bone in the ash of the hearths.

Champagne 1 was quite similar to Champagne 3. The wind had exposed a number of burned stones, none larger than four by six inches in diameter, lying in modern dune sands which had been blown in on an eroded surface located well below the level of the volcanic ash. The stones were foreign to the deposit and probably not in situ, but lack of evidence prevents a reasonable guess concerning their origin or the level to which they were brought. It is difficult to account for them except to assume tentatively that they came from the bottom of Stratum No. 2.

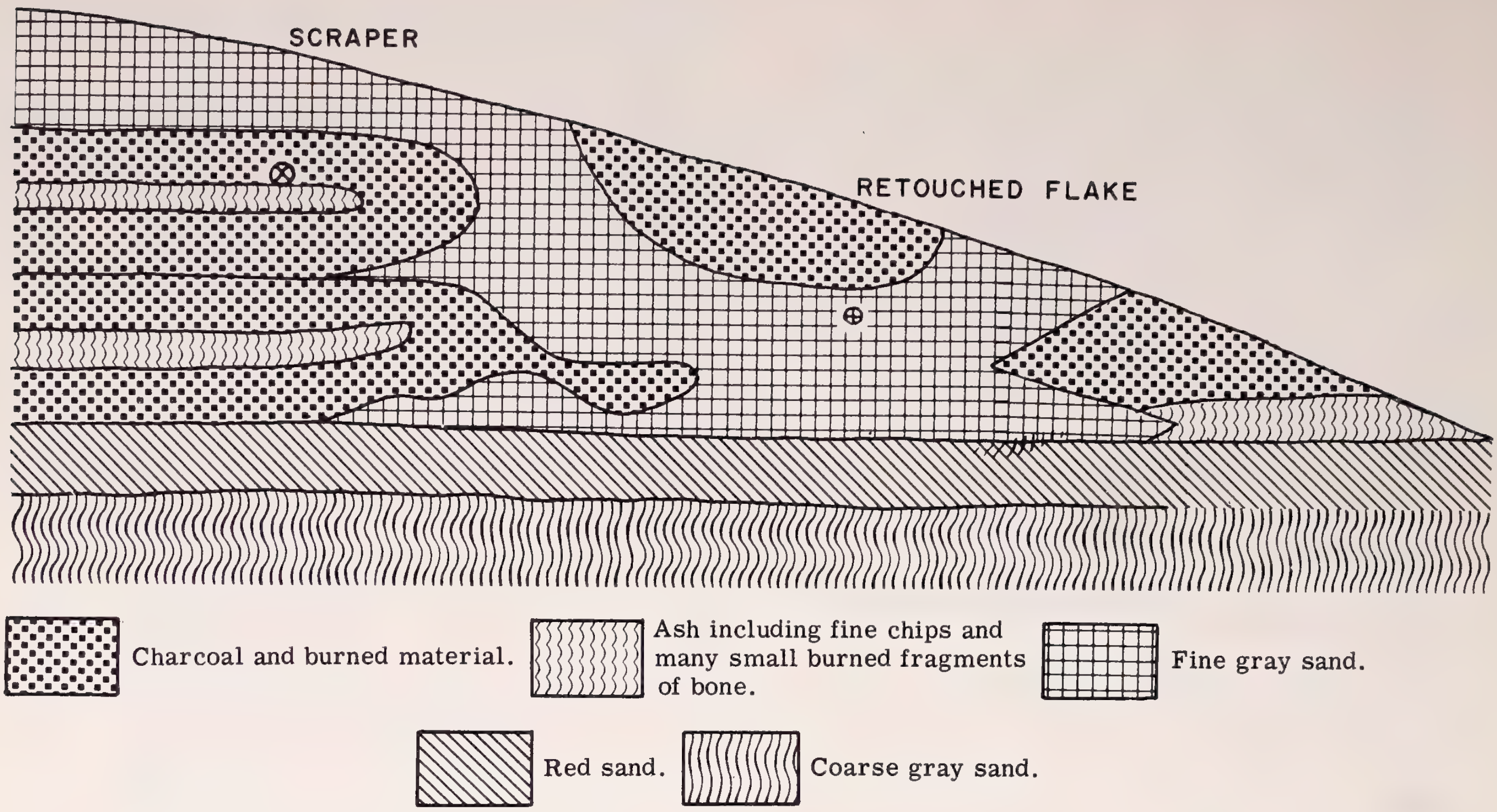


Fig. 21. Diagram to illustrate a series of successive hearths in Champagne 3.

Many chips and a few tools (Fig. 39) were found on the surface in exactly the same relative location as at Champagne 3. It is assumed that these are derived from Stratum No. 2.

Champagne 2, another blowout bordering the river, had a sloping surface which varied from ten to fifty feet wide fronting on the river. At this place the wind had removed all of Strata Nos. 1 and 2 and redeposited the sands to form a modern unstable surface. Chips and artifacts were lying on this surface. Back from the river, however, the wind had cut a vertical bank (Fig. 19c). In this were exposed the various features of Stratum No. 3 and Stratum No. 2. A chip bed was exposed in this bank (Figs. 23a, b). It is in a reddish zone which lies on the coarse gray bedded sand of Stratum No. 1. Various turf layers and the layer of volcanic ash may also be seen in the illustration. The profile, Fig. 22, was located outside the photograph, Fig. 23a. However, it summarizes the situation. Great quantities of chips were removed from the bed and at other places in this bank but no actual tools were found in situ.

Another chip bed was exposed in a vertical cut in the old dunes on the west side of the road leading from the Champagne Post Office to the river. This bed clearly lay beneath the volcanic ash in a position which can be correlated with the layer producing the hearths in Stratum No. 2 at Champagne 3.

To summarize this description we find that the location of the level of occupation at these Champagne sites is clear, even though the area is one which has been subject to wind action, probably since early Hypsithermal time. Water-laid clays and sands underly the whole region. Following the draining of Glacial Lake Champagne, accumulation of fine

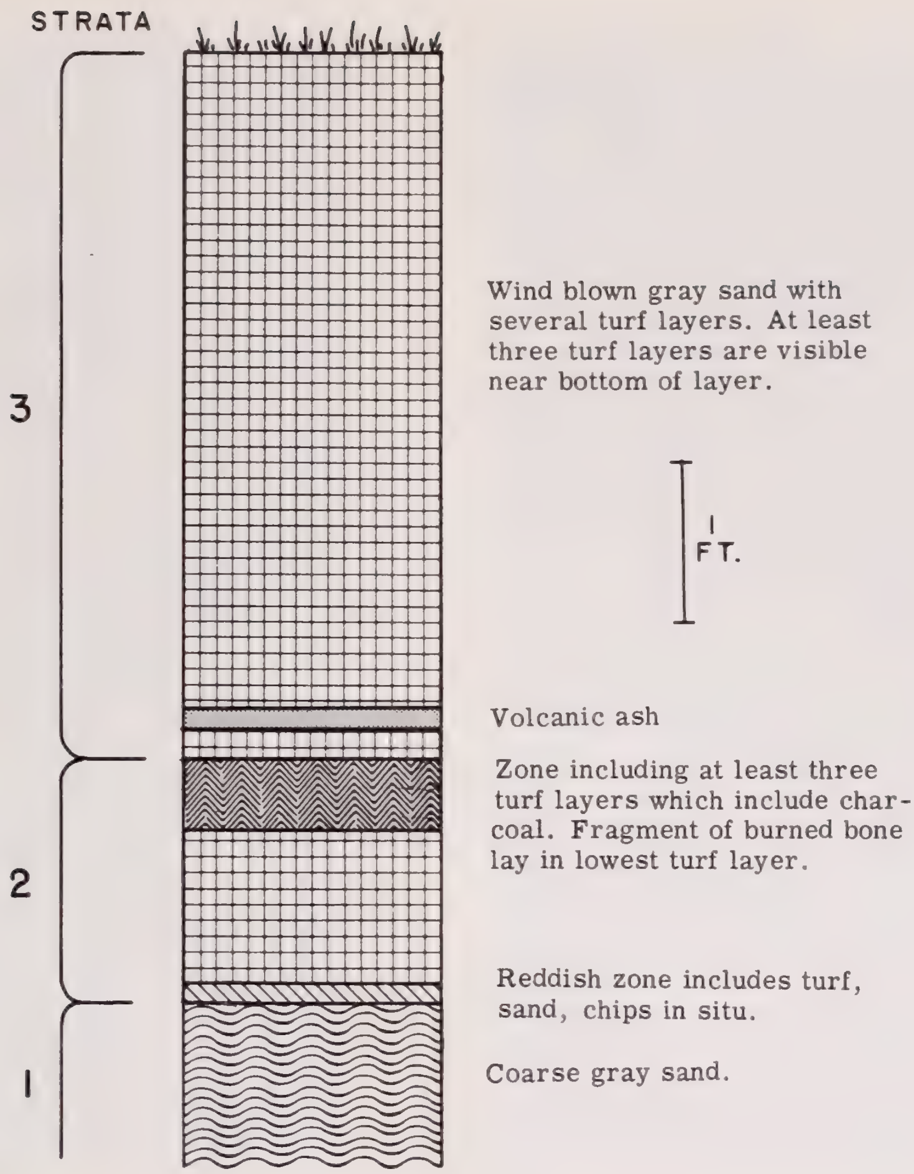


Fig. 22. Cross section of Champagne 2.

gray sand commenced. When the first six or eight inches of this had been deposited, discontinuous areas of the surface became stabilized and a turf layer or complex of them developed. People occupied this surface leaving behind hearths and chip beds. The evidence is circumstantial but it is reasonable to assume they also left the artifacts we found eroding out of Stratum No. 2. It is probable that the red color of this lowest level is due to some process of soil development which occurred while the surface remained at about the level of the turf layer.

Eventually deposition of the gray sand was resumed at these places and it continued with interruptions marked by the turf layers to the present. The volcanic ash layer gives us a date for termination of the accumulation of Stratum No. 2, but its significance relative to the positions of the stone tools is obscured by the unpredictable rates of soil deposition and erosion in an area of this kind. Further work in the region would provide the detail needed to form chronological estimates for this sequence of events, especially those preceding the deposition of the volcanic ash.


a


b


c

Fig. 23. Views of cross sections at sites Champagne 2 and Canyon 1. a. Champagne 2: detail of cross section to show location of chip bed in reddish zone (June 20, 1948). b. Champagne 2: detail of upper surface of chip bed located at bottom of cross section in adjoining Fig. (June 20, 1948). c. Canyon 1: view of cross section of top of bluff exposed in cut made for oil pipe line bordering Highway (June 8, 1948).

The Canyon Site

The Aishihik River runs southward from its source at Aishihik Lake to meet the Dezadeash River south of the settlement at Canyon located on the Highway. The southern part of the valley of the river is deep and where it joins the Dezadeash Valley the west side is steep, being marked especially by a high terrace. It is estimated that this terrace lies some one hundred feet or more above the valley floor.

Investigations brought to light surface indications that both sides of the Aishihik Valley had been occupied early in its recent history. We chose the high terrace on the west side of the valley as the most promising location for our limited excavations. MacNeish was able to excavate more extensively at a location north of our trench and he also excavated on the east side of the river. His sites are numbered JfVg-1, 2, and 3.

This terrace has been exposed to wind action throughout its recent history so that interpretation of the significance of the soils as they appear in the dunes requires detailed analysis of many observations and even then the conclusions are subject to some uncertainties.

Figures 23c and 24a-d illustrate the situation commonly seen in exposures along the terrace. Seven major strata can be identified in a deep and wide trench cut for the purpose of laying the oil pipeline which parallels the Highway. The seven strata are described below.

Stratum No. 1. The lowest stratum seen. This is comprised of partially cemented sand lying in nearly horizontal layers. Old roots encased in tubes of carbonate were seen in the upper layers of this sand. There were also modern roots at the same levels. The horizontal layers in the sand appeared to be truncated so that the surface of the layers dipped slightly downward toward the west. The surfaces of most of the overlying strata paralleled this slope.

Stratum No. 2. A stratum of gray clayey fine sand. The sand is finer than that of the underlying stratum. Near the top of this stratum there was a thin but prominent layer which included chunks of charcoal and other carbonized materials. In places there were old roots encased in carbonate. A few modern roots were also observed.

Stratum No. 3. This very important stratum is composed of reddish brown fine sand which includes a small proportion of clay. The sand appears to be layered because small differences in the fineness of the sand were observed. The whole stratum contained layers of turf, similar to those described from the Little Arm site and Champagne. These layers are continuous toward the west. They are interrupted to the east, towards the face of the terrace, probably by the truncation described below. The lower ten inches of this stratum is transitional to the underlying Stratum No. 2. In this part of the section fine roots in calcareous tubes were observed. Occasional modern roots were found throughout.

Stratum No. 4. Lying on the turf layer which was the top of Stratum No. 3 was a gray fine sand with faint lenses of reddish sand which appeared to be finer. Included in small lenses in the sand were white de-

posits appearing to be concentrations of calcareous material. Occasional roots were observed and there was a well defined turf layer at the top, especially in the western parts of the stratum.

Stratum No. 5. This stratum was much like Stratum No. 4 except that it appeared to be a little darker and slightly less red in color. A turf layer covers the top of Stratum No. 5. And, as shown in Fig. 24a, toward the east it extends over the termination of the stratum to become the top of Stratum No. 4.

Stratum No. 6. The gray fine sand of this stratum includes a layer of volcanic ash which is about one inch thick. There are old roots and also modern roots which can be traced directly to the surface. This is topped by a well defined turf layer.

Stratum No. 7. Gray fine sand of this stratum is similar to the underlying material. There are minor turf layers in the stratum. The top is the present surface and is sparsely covered by grasses, shrubs, etc.

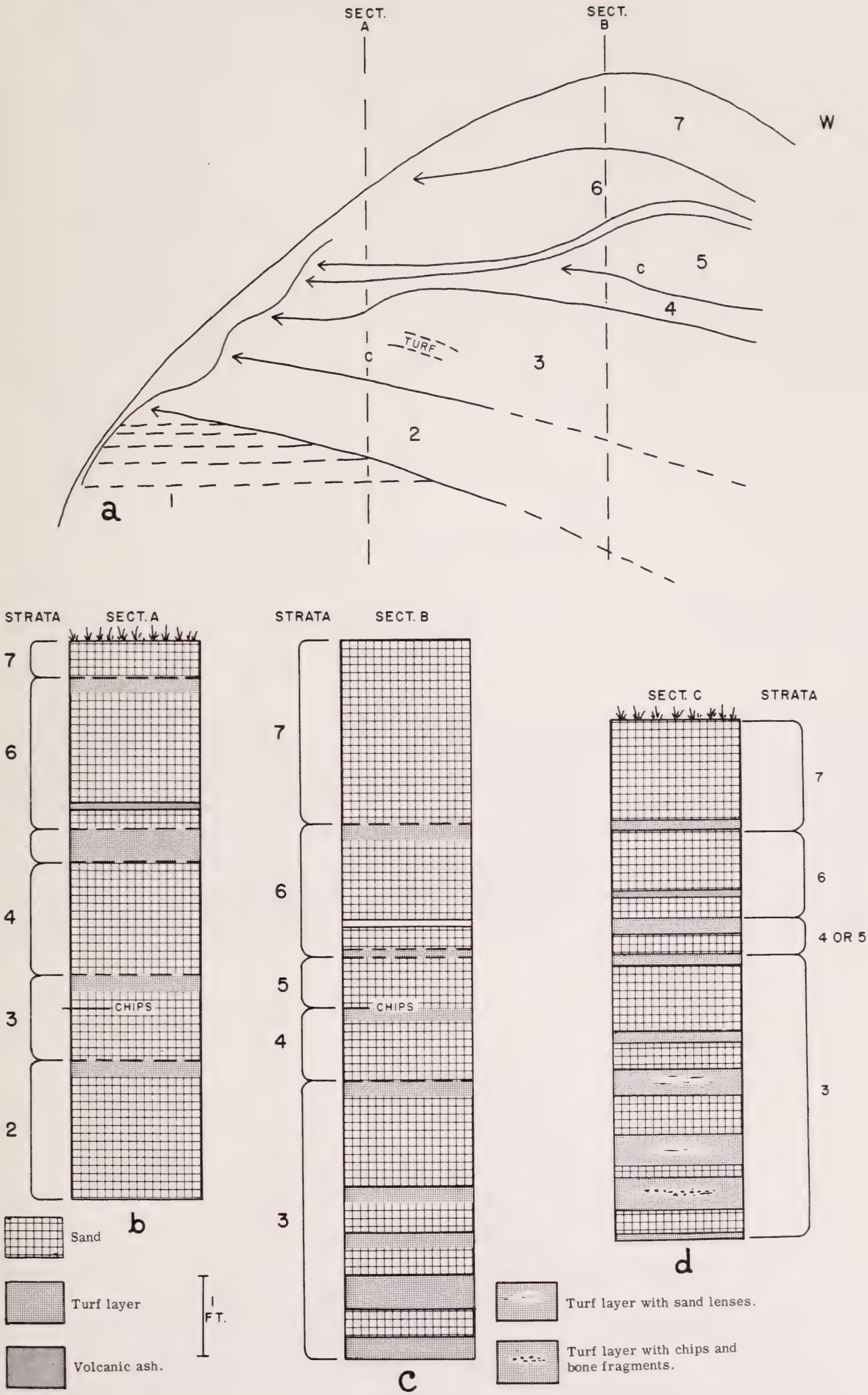
As mentioned above, the eastern ends of these strata are truncated near the face of the terrace. The process of truncation may well be the effect of wind action. It appears to have modified the various sand and turf layers for a distance of some ten or twelve feet. Lying on the truncated ends of the strata is a deposit of very irregular thickness. This is comprised of gray fine sand which appears to be an extension or perhaps a slumping of Strata 6 and 7. Some of this is presently in process of being moved by the wind and some is covered with the modern turf.

Evidence of human occupation appears at two levels below the layer of volcanic ash (Fig. 24b and c). Section B records chips in the top of Stratum No. 4, seven and one-half inches below the ash. Other evidences of occupation were found in Stratum No. 3 between thirty and more than forty inches below the ash. Chips, bone fragments and small pieces of charcoal were scattered over the area exposed by our excavations in the turf layer which separated Stratum No. 3 from Stratum No. 2. It is barely possible that the number of chips, bone fragments and amount of charcoal found in the north end of the trench comprised the remains of a hearth. Unfortunately, no artifacts were found in our excavations.

The location of artifacts found on the surface is always open to suspicion. The southern end of the site had been removed during excavation of a deep road cut. This had been stepped back in a series of narrow ledges. In one of these the lower part of Stratum No. 3 and the upper part of Stratum No. 2 had been exposed. The next bench above was below the top of Stratum No. 3. The artifacts were all found in an area about three feet by ten feet on the bench which lay below the level of the top of Stratum No. 2. The probability is that the artifacts originated in Stratum No. 3. If the artifacts had come from higher levels, i.e. Stratum No. 4 and above, it is most likely that they would have come to rest on one of the upper benches (Fig. 25). An assumption that the artifacts are associated with levels in Stratum No. 3 is supported by typological considerations.

The Canyon Site comprises a series of deposits laid down by the

Fig. 24. Cross sections of Canyon 1. a. Diagram of cross section of pipe line cut paralleling the Highway (cf. Fig. 23c). b. Cross section, Section A. c. Cross section, Section B. d. Cross section, south wall of archaeological trench.


SECT. A
SECT. B
W
7
6
5
4
3
2
1
C
TURF
a
STRATA
SECT. A
CHIPS
b
STRATA
SECT. B
CHIPS
c
SECT. C
STRATA
4 OR 5
d
Sand
Turf layer
Volcanic ash.
1 FT.
Turf layer with sand lenses.
Turf layer with chips and bone fragments.

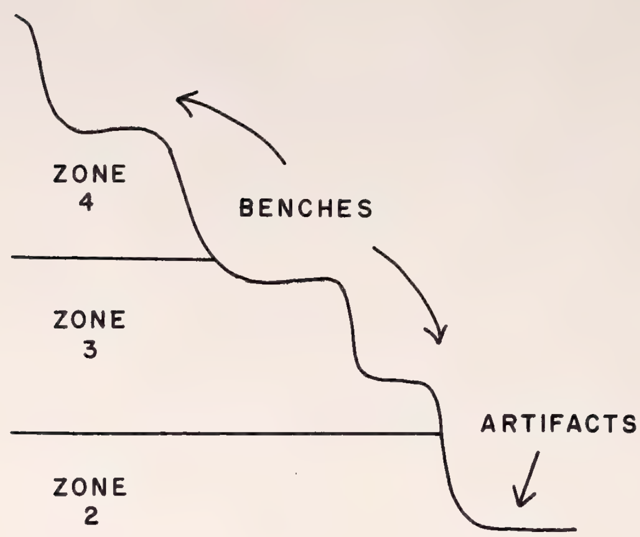


Fig. 25. Diagram to illustrate assumed original provenience of artifacts at Canyon 1.

action of the winds. They are similar in many ways to the deposits at Champagne. The turf layers are evidence of development of exposed surfaces which last for a measurable period of time. These layers also seal off the underlying deposits. The layer of volcanic ash is important in that wherever it is in situ it also seals off the underlying deposits. In view of the series of turf layers and the layer of volcanic ash which apparently is in situ or, if it was moved by contemporary winds before final burial, such change in locus is not important in the present context.

THE VEGETATION

FORESTS

The forests of the Dezadeash and Shakwak Valleys are simple in structure and species composition. Only seven kinds of trees have been found in them, not counting a few species of willows that approach tree-size. These willows, such as Salix arbusculoides and S. padophylla, always occur in the understory among larger trees. Of the seven trees, three are rare or have limited distributions within the valley.

The lodgepole pine (Pinus contorta var. latifolia) is widespread in the western interior valleys of British Columbia and southern Yukon, but it comes westward into the Shakwak Valley only a short distance. Along the Alaska Highway the last ones we were able to find were at mile 982, which is only about eight miles west of Champagne. It grows ordinarily on excessively drained soils such as outwash sands and gravels.

White birch (Betula papyrifera var. neoalaskana) is a widespread constituent of the upland spruce forests of the Mackenzie and Yukon River basins, but in our region it occurs only as rare, scattered, and poorly formed trees. An occasional one was seen in the Dezadeash Valley, particularly on the gravel beaches of the later post-Hypsithermal lakes. None was found in the vicinity of Kluane Lake except for a few toward the head of the fjord-like Talbot Arm on the north side, and in the mountains to the northward where more were seen. It becomes relatively common on mountain slopes west of the Kluane Lake basin, but we found it necessary to go beyond the White River to find it in appreciable quantity.

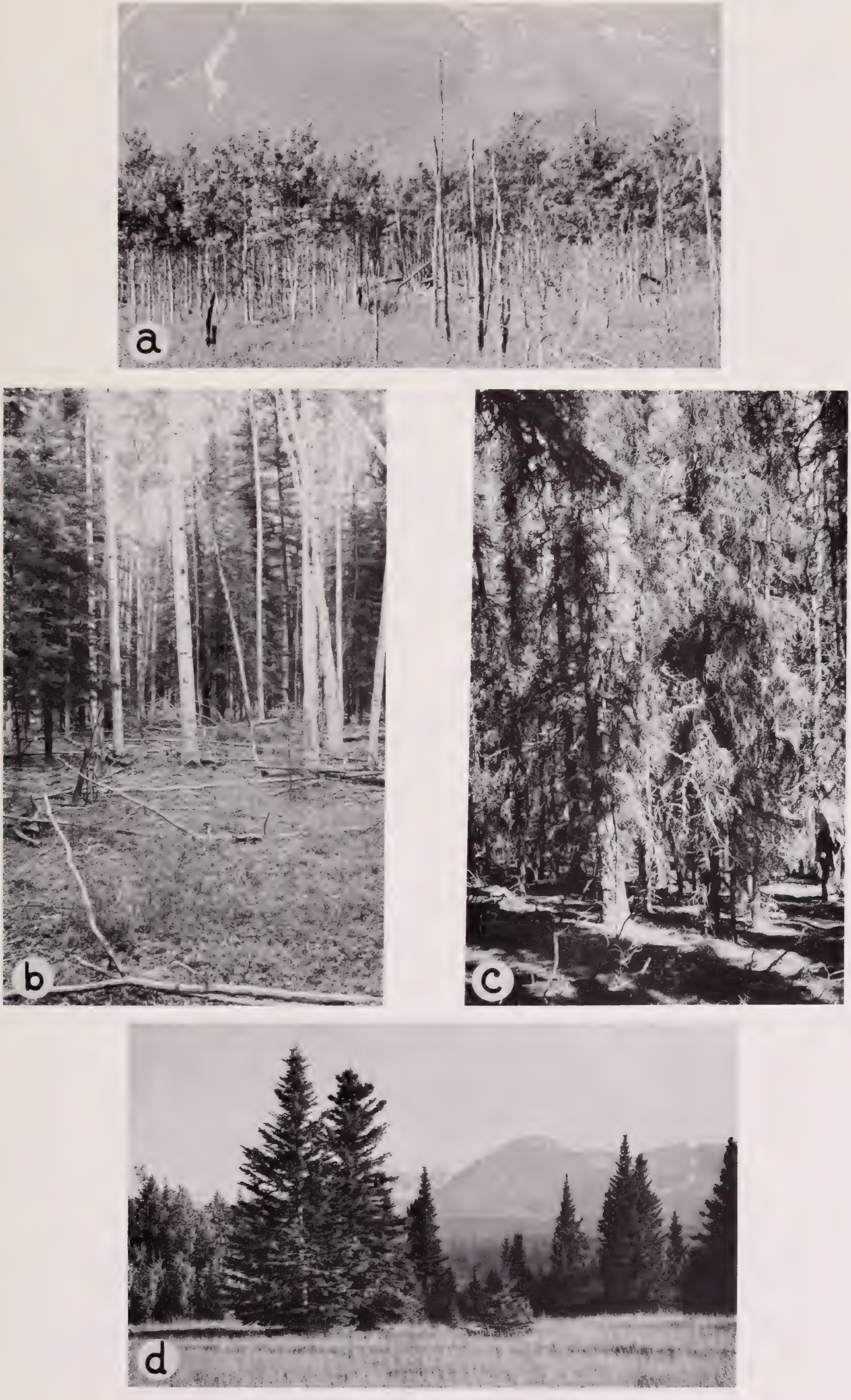
Black spruce (Picea mariana), one of the commonest and most widely distributed species in the American boreal forest, also shows a gap in its range in the Dezadeash and Shakwak Valleys. Throughout most of its range it is the characteristic tree of muskegs, and in northern British Columbia and southern Yukon it is abundant on water-logged lacustrine clays or clayey silts. In the northern Cordillera it becomes a common species on steep north-facing slopes, extending up nearly or quite to timberline. All of these habitats are to be found in the Dezadeash-Shakwak Valley, but the black spruce is not there to occupy them. As in the case of the white birch, some were found at the head of Talbot Arm of Kluane Lake and in the mountains north of it, and the species becomes abundant between the White River and the Yukon-Alaska border.

The four remaining species are white spruce (Picea glauca var. albertiana), Porsild spruce (Picea glauca var. Porsildii), balsam poplar (Populus balsamifera), and trembling aspen (Populus tremuloides). Three of these are more or less restricted by their site preferences.

Balsam poplar, though it appears occasionally in upland spruce woods, is nearly always found on gravel fans or flood plains where its roots have access to running or well-aerated water. It grows also on lake beaches of sand and gravel (Fig. 26a).

It is difficult to define a "natural" habitat for the trembling aspen,

Fig. 26. Forest and grassland in the Dezadeash and Shakwak Valleys. a. Balsam poplar (Populus balsamifera) on an outwash gravel fan along the Haines Road near Haines Junction (June 24, 1948). b. Aspen-spruce forest developed after fire. Tanana River Valley near mile 1384 (Populus tremuloides, Picea glauca var. albertiana). Although this photograph was not made in the Shakwak Valley, it illustrates a kind of forest commonly found there. c. Forest of white spruce (Picea glauca var. albertiana) near shore of Kluane Lake at mile 1064. In large areas the spruce is the only vascular plant. The ground is covered with a thick mat of woodland mosses (July 5, 1944). d. Grassland and Porsild spruce (Picea glauca var. Porsildii) in the Dezadeash Valley between Haines Junction and Pine Creek, near mile 1018 (August 27, 1944).


a
b
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d

for it is a "weed tree" throughout the boreal forest. It comes up in abundance after various kinds of disturbances, the most important of which over time has been fire. It is a relatively short-lived tree, and in the course of forest development following a burn it is soon replaced by the conifers. Because of the common occurrence of fire in the boreal forest -- and our region is no exception -- aspen of varying ages, in pure stands or in a variety of mixtures with other species, is scattered throughout the landscape (Fig. 26b).

The Porsild spruce, though closely related to the so-called Alberta spruce (P. glauca var. albertiana) is easily distinguished from it. The latter is narrowly pyramidal or columnar in form, and has a rough, rather dull-gray bark, while the Porsild spruce is broadly pyramidal in outline and has a smooth, lighter gray bark with resin blisters in it not unlike those of the balsam fir. The Porsild spruce is known only in Yukon, western Mackenzie, the northern Rocky Mountains, and the eastern interior of Alaska. The range and characteristics of the Porsild spruce have recently been reviewed in a report prepared by Robert W. Funsch for the Northern Forest Experiment Station, U.S. Forest Service, College, Alaska. The manuscript is as yet unpublished. It is locally common in the Dezadeash and Shakwak Valleys. In the lower Dezadeash basin it appears in the borders of the prairies that grow on the beds of the more recent lakes (Fig. 26d), and mixed with the Alberta white spruce on the gravel beaches of these lakes. In the Kluane Lake basin it grows sporadically on gravel fans, but is particularly abundant on well-drained soils on knolls and ridges in the "knob-and-kettle" morainic topography between the lake and Jarvis River.

Except for the relatively small prairies of the Dezadeash Valley and a few small ones in the Kluane Lake region, together with some shrubby muskeg land and wet meadow here and there, the Dezadeash and Shakwak Valleys are forested up to timberline on the neighboring mountain slopes (3, 500-4, 000 feet). It will be noted from the above discussion that the only tree left with which to cover most of this territory is the Alberta white spruce. In most of its wide range in northwestern America this spruce occupies relatively well- to moderately well-drained upland soils or flood plains that are supplied with abundant subsurface running water. In our region, however, it grows in all kinds of forest sites, from the driest sand and gravel outwash plains where the internal drainage is excessive, to muskegs where the water table is continually high and the water non-aerated. It occupies sand dunes, sand and gravel lake beaches, river flood plains, vast areas of well-drained aeolian silt on flat or gently rolling plains, and mountain slopes of till or colluvium with or without a high permafrost table.

The general geography of the seven species, together with their habitat preferences, results in extreme simplicity in the Dezadeash-Shakwak Valley forests. This reaches the ultimate in some mature forests around Kluane Lake where the ground cover consists solely of a thick mat of woodland mosses and a few fruticose lichens, and there is no vascular plant to be found except the Alberta white spruce (Fig. 26c).

The principal variations in the spruce forest are measurable, superficially at least, in terms of the forms of the trees (including their heights, ages and attitudes), and their spacing on the ground. These measures reflect gradients in the forest sites, and can be dealt with here only briefly.

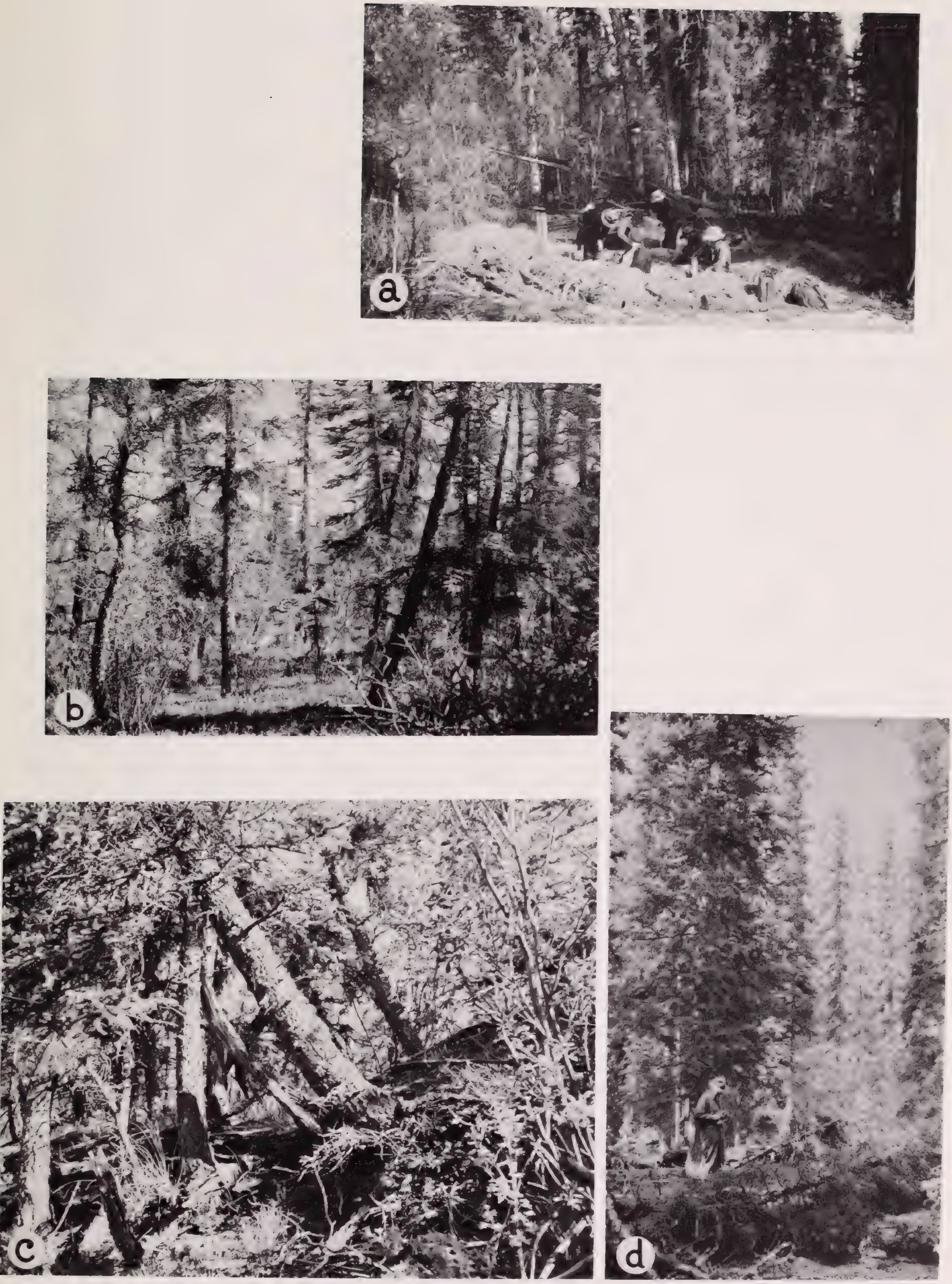
The tallest spruces, straightest in form, and making the densest stand on the ground, are on the flood plains of the larger streams. The most extensive we saw are on the lower parts of the Duke River fan west of Kluane Lake (Fig. 27a). Here the trees are straight, spaced 15-20 feet apart, 75-100 feet tall, 12-20 inches d.b.h., and upwards of 200 years old. The ground cover is sparse, with a few mats of moss and a great deal of damp silt from periodic flooding by the Duke River. Occasional willows make a scattered undergrowth (Salix arbusculoides, S. padophylla, S. alaxensis, and S. glauca var. acutifolia). Herbaceous species seen were Equisetum pratense, Habenaria obtusata, Cypripedium passerinum, Astragalus yukonis, Oxytropis retrorsa var. sericea, and Erigeron lonchophyllus. Spruces of this form are sometimes found on similar sites in mixture with balsam poplars, the latter old and falling into decay. This is because flood plain surfaces often change due to shifting channels, starting new deposits. The beginning forest on these new soils usually is of balsam poplar, which lasts through only one generation and is succeeded by spruce.

Fundamentally similar flood plain forests of spruce or spruce and poplar are to be found on small alluvial deposits throughout the area. Many have richer ground and shrub layers than the above, but their total area in the aggregate is not great.

Much more common forests are on well- to moderately-drained uplands that are more or less level or gently rolling. The soils may be loessal or lacustrine silts, clayey silts or silty sands, or they may be glacial tills. Here the major trees are farther apart (commonly 15-30 feet) and only 60-70 feet tall. However, they are likely to have grown faster in diameter than the flood plain spruce. Trees 15-20 inches d.b.h. may be only 100-130 years old (Fig. 27d). Such trees, of course, have a pronounced taper in their logs, and commonly have spiral grain in the wood. The woodland mosses and raw humus on the ground make a mat 4-6 inches thick, and there is a scattered shrub layer of Salix glauca var. acutifolia, S. Bebbiana, Shepherdia canadensis and Rosa acicularis. Herbaceous species found in these woods are Bromus pumpellianus var. arcticus, Poa glauca, Poa alpigena, Carex concinna, Mertensia paniculata, Polemonium acutiflorum, etc.

Still more open spruce woods are found on excessively drained soils such as dune sands, outwash sand and gravel deposits, sandy tills, or old lake beaches. Here the trees are so far apart that the forest is parklike in aspect, and the Alberta white spruce is sometimes mixed with Porsild spruce (Fig. 26d). The ground is thinly covered with a few mosses among which Polytrichum is a common genus, and more fruticose lichens (Cladonia spp., Cetraria spp.). This ground cover is interspersed with large

Fig. 27. Forests of the Dezadeash and Shakwak Valleys. *a*. Spruce forest on the flood plain of the Duke River west of Kluane Lake. In the foreground are ruins of House No. 2 in process of excavation (July 31, 1948). *b*. "Drunken forest" of white spruce (*Picea glauca* var. *albertiana*) on north-facing slope of Shakwak Valley near southwest shore of Kluane Lake, vicinity of Destruction Bay, mile 1083. The soils are subject to slip on the permafrost, and the trees are displaced by the process. Some of the trees are between 400 and 500 years old (August 25, 1948). *c*. "Drunken forest" on a sloping terrace about fifteen feet above the level of Kluane Lake at the head of Talbot Arm. Note trees split by slippage on permafrost (August 20, 1944). *d*. Forest of white spruce (*Picea glauca* var. *albertiana*) on upland along north side of Dezadeash Valley near Pine Creek, altitude about 2040 feet (September 4, 1948).



mats of Arctostaphylos Uva-ursi and Dryas punctata. Shrubs are present but scattered: Salix glauca var. acutifolia, Juniperus communs var. montana, Shepherdia canadensis, Potentilla fruticosa. The herbaceous flora is equally scattered. In two or three acres of these forests one can find 25 to 30 species, none of them in abundance.

The soils on the mountain slopes bordering the valley are mainly colluvial. They were originally glacial tills or sorted materials, but most of them have been greatly modified by solifluction. On south-facing slopes the forests may be much like those of well to moderately drained soils on the valley floor, but are often open and interspersed with small prairies. On north-facing slopes the aspect of the woods is quite different. Here the trees are more stunted and twisted, and are commonly leaning in all directions (Fig. 27b, c). They are apt to grow very slowly, taking between 400 and 500 years to attain heights of 30-40 feet and diameters of 6-8 inches. Mortality is high among these trees. A count in any given area is likely to show that 20-30 percent of the standing ones are dead. The soils in which they grow are subject to mass slumping, usually on a permafrost table beneath the surface, and when this happens the trees are tipped and their roots pulled loose. Sometimes the bases of the trunks are split in the process (Fig. 27c). They suffer periodic suppressions of growth from this cause, and may or may not recover from them (Raup, 1951, p. 111). These slope forests usually have a rather thick mat of mosses and fruticose lichens under them, but have a scattered understory of shrubby and herbaceous plants. On the lower slopes the ground and shrub layers are much like those in the valley forests, but toward timberline the species of the tundra begin to appear.

The incidence of fire in the Dezadeash and Shakwak Valleys has already been mentioned, but it must be emphasized. In all our studies of soils and vegetation in the valleys proper we found evidence of fire. This was in the form of charcoal, or partially burned wood buried in the soil, or fire scars on living trees. Bits of charcoal were found in every profile of wind-deposited silts that we examined and in every organic horizon separating the lake bed silts in the lower Dezadeash basin. There can be no doubt that fire has been a major factor in the life of the valley from the beginning of occupance.

GRASSLANDS

One of the most striking features of the Dezadeash and Shakwak Valley vegetation is its natural grassland. Small grassy openings in the forest, chiefly on warm, dry, south-facing bluffs, are common throughout much of northern British Columbia and southern Yukon, so that a traveler on the Alaska Highway is accustomed to them long before he reaches the Dezadeash Valley west of Champagne. From this point on the prairie openings on the north side of the valley appear to be more extensive (Fig. 28a), and the great morainic ridge which crosses the valley, just east of Champagne is itself mostly covered with a kind of prairie (Figs. 4b, 19b). A notable change in the nature of the grasslands occurs along the Highway between miles 1013 and 1016, where the road drops into the lower basin of the Dezadeash, and begins to traverse the sediments deposited in the post-hypsithermal lakes. Here the prairies are no longer confined to dry slopes and south-facing bluffs, but cover portions of the level to gently sloping valley floor (Fig. 28b). They also change in species composition. In the Kluane Lake basin the grasslands are again more or less confined to dry slopes and bluffs, with one notable exception. This is on the broad sand and gravel outwash plain of the Duke River west of Kluane Lake where there are several hundred acres known locally as the "Duke Meadows."

There is neither space nor occasion in the present paper for a detailed description of these grasslands. Rather we shall limit ourselves to a general account of their geographic affinities, the major differences among them, and the probable relationship of these differences to site. Their geographic affinities can be seen in the distribution of principal species, such as the grasses, that characterize them.

Twenty-seven species of grasses were collected in the Dezadeash and Shakwak Valleys, nearly all of them in the prairies (Table 1). Two-thirds of them (eighteen), have wide ranges in boreal America, extending across the continent from Newfoundland and Labrador to Yukon or Alaska, and about ten of them are circumboreal in the Northern Hemisphere. Seventeen of these eighteen species are not confined to the boreal forest region or the northern interior grasslands, but extend their ranges into the Arctic tundra. Seven of them have the major parts of their areas in the tundra. The remaining nine of the twenty-seven species collected are primarily western or northwestern American. They may be divided into two groups. Five of them (*Agropyron dasystachyum*, *Puccinellia Nuttalliana*, *Poa Buckleyana*, *P. Canbyi*, *P. Cusickii*) have extensive ranges in northwestern United States and western Canada, the dry interior valleys of British Columbia and into southern Yukon. None of them is abundant in the Dezadeash-Shakwak Valley. The other four are species of Alaska and Yukon, or they may extend south into northern interior British Columbia (*Agropyron yukonense*, *Festuca altaica*, *Agropyron alaskanum*,

Fig. 28. Grasslands in the Dezadeash and Bear Creek Valleys. _a_. Dry grassy bluffs on southwestward facing slopes of Bear Creek Valley. View northerly up the Creek (June 11, 1948). _b_. Grassland in Dezadeash Valley about one mile east of Haines Junction, altitude about 1, 970 feet (June 26, 1944). _c_. Grassland on ancient beach in vicinity of Bear Creek, south of mile 1021, altitude about 2, 040 feet (June 27, 1948).


a
b
c

Table 1

Geographic Affinities of Grasses Collected in 1944 and 1948 in the Dezadeash and Shakwak Valleys, Yukon

	Wide-ranging species in North America				Western species in America	
	Species with main ranges in arctic tundra region	In both tundra and boreal forest regions	Species with main ranges in boreal forest region	Total range of species circum-boreal	Plains and mts. of N.W. United States and Canada	N. British Columbia, Yukon, Alaska (incl. arctic Alaska)
Bromus Pumpellianus var. arcticus						+
Festuca saximontana		+	+			
Festuca brachyphylla	+	+		+		
Festuca rubra s.l.		+		+		
Festuca altaica						+
Puccinellia Nuttalliana					+	
Poa alpigena	+	+		+		
Poa nemoralis		+	+	+		
Poa palustris		+	+	+		
Poa glauca	+	+		+		
Poa Cusickii					+	
Poa Canbyi					+	
Poa Buckleyana					+	
Agropyron dasytachyum					+	
Agropyron yukonense						+
Agropyron alaskanum						+
Agropyron trachycaulum s.l.		+	+			
Agropyron latiglume	+	+				
Trisetum spicatum var. molle	+	+		+		
Deschampsia caespitosa	+	+		+		
Danthonia intermedia			+			
Calamagrostis purpurascens	+	+				
Calamagrostis inexpansa var. brevior		+	+			
Calamagrostis lapponica var. nearctica		+				
Calamagrostis neglecta		+		+		
Agrostis scabra		+	+			
Hierochloë odorata		+	+	+		

Bromus Pumpellianus var. arcticus). All of these four are also known in the arctic tundra of northern Alaska.

From the above analysis it is evident that all but five of the grasses we found in the Dezadeash and Shakwak Valleys are primarily species of the boreal forest or the arctic tundra. For the most part they are plants of forest and wet meadow margins, or they grow on dry, wind-swept, usually south-facing bluffs. In the arid interior valleys of southwestern Yukon they find expansions of these habitats, and can occupy more space. The other five species require individual discussion. Puccinellia Nuttalliana grows in slightly brackish soils, and is a common grass at the margin of the mud flats in the Slims River flood plain at the southeastern end of Kluane Lake. It was found only in this vicinity, though it would no doubt turn up elsewhere in similar sites. Poa Canbyi and P. Cusickii are both grasses of the dry plains and valleys of western United States and Canada, and both appear to be rare in the Dezadeash-Shakwak Valley. Poa Canbyi has not been found west of the neighborhood of Champagne, and P. Cusickii was collected only once, on a high terrace of the

Bear Creek Gravels. Poa Buckleyana, another western plains species, appears sporadically in the prairies of the lower Dezadeash basin. Agropyron dasystachyum also grows in these prairies, but is not as common there as its near relative, A. Yukonense.

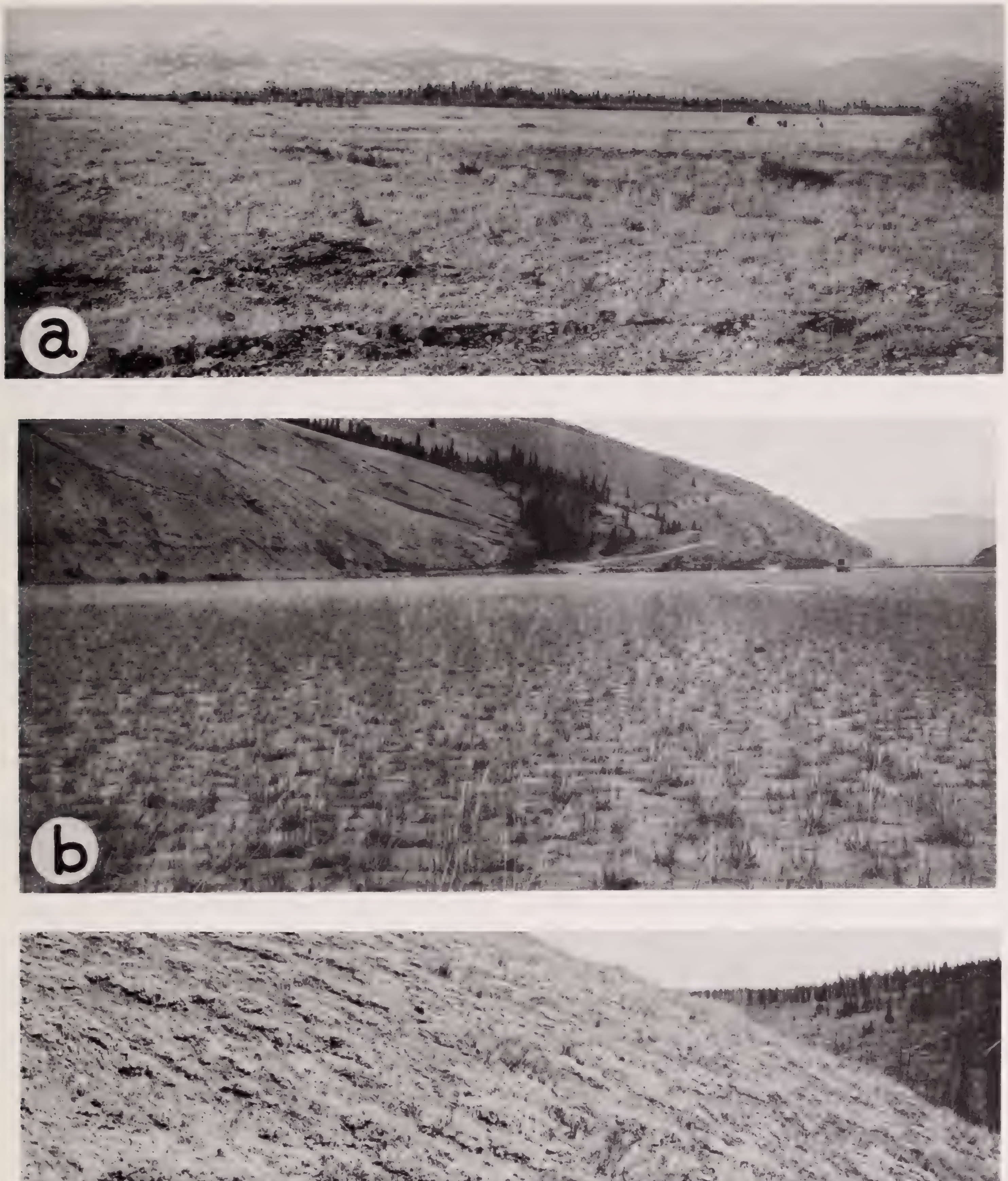
Other elements in the grassland flora can be analyzed in the same way, and yield approximately the same results. In some groups one or another of the species derived from the more southern mountain valleys and interior plains takes a prominent place in the local scene, but as a rule the commonest species are those from the boreal forest or tundra floras.

The grasslands grade into one another in many places, but in general they can be divided into two phases that seem to be coincident with differences in soils and moisture regimes. The commonest type is the drier of the two, and is found on dry, well-drained bluffs, or on sand or gravel plains that are veneered with enough fine-textured material to make a soil. The general aspect of the vegetation on such areas is that of "bunch-grass prairie." The principal grasses are tufted and low-grown (Poa glauca, Calamagrostis purpurascens) and they often share first place with xerophytic sedges, some of which, like Carex filifolia, are caespitose while others are rhizomatous but do not form a turf (Carex supina ssp. spaniocarpa, C. obtusata). Also sharing major prominence occasionally with these grasses and sedges are the sage (Artemisia frigida) and the bear berry (Arctostaphylos Uva-ursi). It is not uncommon to list 30 to 35 species of secondary significance in the dry prairies. There are occasional shrubs of Salix glauca var. acutifolia, S. Bebbiana, Rosa acicularis, Shepherdia canadensis. Splashes of color are lent by Aster alpinus ssp. Vierhapperi, Potentilla nivea ssp. Hookeriana, Polemonium pulcherimum, Penstemon Gormanii, Oxytropis splendens, etc. But the general color tone of these prairies is a rather dull greenish gray, and they have a distinctive scent given to them by the sage, which is highly aromatic and prevalent.

Along the Alaska Highway the dry prairies are conspicuous on the Champagne moraine (Figs. 4b, 19b) on the wide expanses of old gravel and sand beaches in the lower Dezadeash Valley near mile 1021 (Fig. 28c), at several places on bluffs and lower mountain slopes on the shores of Kluane Lake (those at Slims River and near mile 1074 are notable (Fig. 29b, c)), and in the Duke Meadows just west of Kluane Lake (Fig. 29a). These are the larger areas, but there are many smaller ones.

The second major phase of the grasslands is on finer-textured soils that are more moist. By far the largest development of these prairies is on silts laid down in the bottoms of post-Hypsithermal lakes in the Dezadeash Valley below the beach which appears at mile 1013 on the Highway (altitude about 2,120 feet). The treeless areas are of varying size and shape, but their longest axes tend to parallel the trends of the old beaches. Some are only an acre in extent while others are two or three miles long (Fig. 28b). They may be on nearly level to gently sloping land, or on low rounded hills. The moisture regimes in the soils

Fig. 29. Grasslands in the Shakwak Valley. a. Grassland in "Duke Meadow" on abandoned Duke River flood plain west of Burwash Landing. View northward from the Alaska Highway (August 24, 1948). b. Slims River delta, showing scanty vegetation of grasses on the mud flats near the northwest corner of the delta (July 22, 1944). c. Grass-sage vegetation on south-facing bluff near Kluane Lake, mile 1074 (July 17, 1944).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also vary greatly, as would be expected, from relatively well-drained soils on slopes to marshlike conditions in shallow depressions. Day has described some of these soils (1962).

The grasses and other herbaceous plants that form the prairies here are taller than in the drier lands, and some of the grasses are strongly rhizomatous and turf-forming. The general aspect is that of the "mid-grass" prairies that one sees in the Peace River region though many of the species found in the latter are missing. The richest of the Dezadeash prairies have a mixture of grasses in their primary flora: Agropyron trachycaulum (typical species and vars. unilaterale and novae-angliae), Festuca rubra, Agrostis scabra, Trisetum spicatum var. molle, Hierochloë odorata, Calamagrostis inexpansa var. brevior. Where the soils are somewhat better drained there is less of Festuca rubra, Agrostis, Trisetum and Hierochloë, but Agropyron yukonensis becomes prominent, and some of the dry prairie species are added: Calamagrostis purpurascens, Poa glauca, Festuca saximontana. On wetter soils the complex is often greatly simplified, and the prairie is reduced to nearly pure stands of Hierochloë odorata or a rush (Juncus balticus var. littoralis), or of mixtures of the two (Fig. 2a).

The prairies are usually broken here and there by clumps of willows, groves of trembling aspens, and spruces standing out as individual trees or small groups (Fig. 2a). Picea glauca var. Porsildii commonly appears thus in the open land (Fig. 26d). In summer the prairies are a blaze of color from an abundance of flowering herbs. The commonest are Penstemon procerus, Potentilla arguta, P. anserina, P. diversifolia var. glaucophylla, Polemonium pulcherrimum, Hedysarum mackenzii, Anemone multifida var. hudsoniana, Senecio pauperculus, Solidago decumbens var. oreophila, etc.

Some further mention should be made of the vegetation on the flood plain of Slims River because of the crucial significance of this kind of site in the history of surficial deposits. The river has built a broad delta of silt into Kluane Lake (Fig. 3c). It is about two and one-quarter miles wide at the lower end, and approximately fourteen miles long, narrowing upstream between the steep valley walls (Bostock, 1952). It is flooded in early summer when the thaw brings meltwater down from the mountain glaciers. In late summer and autumn the river is reduced to a relatively small stream and the silt flats become dry at the surface and often cracked. Shallow depressions may remain damp and muddy.

The vegetation is discontinuous on the silt, and may be described in two phases coincident with differing soil moisture. On the largest areas the soil is dry and cracked at the surface in late summer, and the plants are extremely scattered. The principal species is a caespitose grass, Deschampsia caespitosa, individuals of which range from six inches to three feet apart. Secondary species are few and scattered: Aster yukonensis, Taraxacum lacerum, and Hordeum jubatum. More moist areas, in depressions, have the same grass as the primary species, Deschampsia caespitosa, but here the plants are much more closely spaced and give

the appearance of a "green sward" to the flat. (Fig. 29b). A few more secondary species appear (Juncus balticus var. littoralis, J. arcticus ssp. alaskanus, Triglochin palustris), and there are occasional willow bushes (Salix glauca var. acutifolia). Aster yukonensis is particularly common in these damp areas.

It would not take much less disturbance by flooding and down-valley winds than now occurs to allow a complete coverage of this flat by vegetation. The latter probably would be some kind of grassland at the beginning. The kind would depend upon the soil moisture available. It could well be the "bunch-grass prairie" that is common in the vicinity, interspersed with a richer grassland of turf-forming species in the low areas, the whole gradually invaded by willows, aspens and spruce. The pioneer elements of this vegetation are already present, merely held in check by frequent physical disturbance to the substratum.

TUNDRA

In a sense tundra vegetation is now outside the limits of the Dezadeash and Shakwak Valleys proper, for it occupies the neighboring mountains above timberline. Nonetheless it should be discussed, even though briefly, for it has played a large part in the history of the valleys and in the constitution of their present vegetation. The definition of tundra has always been a matter of controversy because of its extreme variability in form and species composition. Perhaps the best definition is a negative one: tundra is arctic or alpine vegetation of low stature in which there are no trees.

The influence of the tundra flora upon the present vegetation of the valley can be seen at every turn. It can be illustrated with the list of grasses in Table 1. Twenty-three of the twenty-seven species listed there also grow in the tundra. Seven of them have the main parts of their ranges in the tundra. Eleven of them have been noted as primary species of grasslands in one or more places in the valley. The floristic influence of the more southern interior plains and valleys, though present, is minor compared to this, and we are constrained to consider the grasslands a floristic amalgam in which the tundra and the boreal forest margins have supplied the major elements. As previously stated, approximately the same results come from analyses of other parts of the flora.

The mountain tundra around the Dezadeash and Shakwak Valleys is a relatively rich one in species composition. It contains not only the large circumpolar element which is common to other parts of the Northern Hemisphere, but also it has a considerable number of species that are "Beringian" in general range (Hulten, 1937, 1958; Raup, 1947a, 1947b), a few that came into it from the northern Rocky Mountains (Porsild, 1951), and a few species that are endemic to central Yukon and Alaska.

The mountain slopes above timberline immediately adjacent to the valleys are commonly rounded in profile, with long, rather gentle ascents to the summits. The latter are often marked by huge monument-like outcrops of bedrock that can be seen on the horizon for many miles (Fig. 30a). Below these rounded upper slopes the sides of the main valleys, and those of their tributaries, pitch off steeply and usually are concave to the sky. The upper slopes of these mountains appear never to have been glaciated, and are a part of the great ice-free area that extended through central Yukon and Alaska during the Pleistocene. Only the valleys had glaciers in them, gouging out the side slopes and leaving till and outwash in the form of lateral and other kinds of morainic deposits. An important result has been that most of the tundra of this region is established on very ancient surfaces. However, the materials of these surfaces have been subject to intense physical disturbance due to a complex of geomorphic processes related in various ways to freezing and thawing, and to the presence of permafrost near the surface of the ground.

Fig. 30. Vegetation and topography on the Yukon Plateau above Ptarmigan Heart Valley, north of Kluane Lake. _a_. Rock monument or residual rock outcrop. Note also long rolling unglaciated slopes. View taken from another rock monument (July 9, 1948). _b_. Mixture of shrub and grass tundra on high rocky ridge, Ruby Range. Note fossil sorted nets (July 16, 1948). _c_. Shrub tundra with scattered _Picea glauca_ near timberline on mountain slope, Ruby Range. The shrubs are primarily _Salix glauca_ and _Betula glandulosa_ (July 16, 1948).


a
b
c

Fig. 31. Tundra vegetation on mountain slopes and summits bordering the Shakwak Valley. _a_. Prairie-like tundra on a long slope just east of Kluane Lake, altitude about 5300 feet (July 18, 1944). _b_. "Niggerhead" tundra near Henry Creek north of Kluane Lake (July 10, 1948). _c_. Thin dry tundra of lichens, mosses and low heaths on soils showing polygonal patterns, summit of mountain in Ruby Range north of Ptarmigan Heart Valley (July 16, 1948).


a
b
c

Permafrost is still present, and evidence of current down-slope flowage of materials on its surface is everywhere to be seen. Sudden massive earthflow is also not uncommon, and the sorting of materials into nets and stripes is of frequent occurrence. These processes and others have been more intensive in the past than they are now, as shown by large "fossil" forms (Fig. 30b). The processes have not only moved soil materials, but they have also greatly altered water regimes in the soils.

The tundra vegetation, apparently an ancient one, seems to have achieved a "built-in" flexibility which has enabled it to keep itself adjusted to the basic instability of its habitat (Hulten, 1937; Raup, 1957). A large number of its species are able to live in disturbed soils, and a great many have a wide range of tolerance in the moisture gradient. They are able to survive and flourish in wet soils or in relatively dry ones. Most of the species seem relatively independent in their relations with other species, growing in wide or close spacings, and in more or less random associations.

In spite of the disorganized nature of much tundra vegetation, it is possible to define some large groupings in terms of form. Not far above timberline, and often merging with it, is a shrub tundra (Fig. 30c). The surface of the ground usually is covered thickly with mosses and fruticose lichens in which grow dwarf birch and several species of heaths and low willows. The shrub growth is often dense, one to two feet high, and difficult to walk through. Many long slopes are covered with rather thick, prairie-like grass-sedge mixtures in which heaths and dwarf willows occur but play a minor role (Fig. 31a). These meadows are often rich in colorful flowering perennials. Dry slopes and ridge tops show a great deal of bare soil, interspersed with thin mats of mosses and lichens, with caespitose grasses, xerophytic sedges and other perennials scattered here and there (Fig. 31c). Undrained or very poorly drained depressions develop what is known in the western American Arctic as "nigger-head tundra." It is formed by the growth of large tussocks of "cotton-grass" (chiefly Eriophorum vaginatum ssp. spissum) which are then accentuated by the frost-heaving of earth cores beneath them.

SUGGESTED ARCHAEOLOGICAL AND
GEOBOTANICAL CONSIDERATIONS

A CHRONOLOGY OF HUMAN OCCUPANCE

We venture the following chronology for occupance of the Dezadeash and Shakwak Valley lands. The Kluane Lake basin could have been occupied by plants and animals, including man, as soon as the glacial ice disappeared and the routes of access were open. The unglaciated Yukon plateau was near at hand and there was no dearth of living stock with which to cover the landscape. As far as we know there has never been at any time since then any geomorphic or climatic process operating in the Kluane Lake basin to eliminate animal or plant life. East of the Kluane Lake basin, on the contrary, if our facts and reasoning are correct, only the land above the margins of Glacial Lake Champagne could have been occupied at any time before the advent of the Hypsithermal periods (Figs. 1 and 6, Lakes 1 and 2). This lake may have extended far to the eastward.

During the Hypsithermal period all of the valleys probably were accessible for occupance, for Glacial Lake Champagne entirely disappeared from the Dezadeash-Alsek drainage basin. During this time vegetation of one form or another covered the valleys, and it is presumed that people lived and moved about in them freely.

With the advent of the post-Hypsithermal lakes the western part of the Dezadeash Valley again became uninhabitable. We do not know the full extent of these lakes. The first was the largest (Fig. 6, Lake 3). It did not extend up the valley as far as Champagne, and thus left a large area in the eastern part accessible. In the western part of the valley, whatever evidence of occupance was left on the surface during Hypsithermal time was buried under the silts of this first lake or of this and subsequent ones. There then followed two progressively smaller lakes in the lower valley of the Dezadeash, each leaving correspondingly larger areas of land free for occupance (Fig. 6, Lakes 4 and 5).

The people who used the stone tools found in the older deposits described came into the Kluane Lake basin soon after the ice left this part of the region and as Kluane loessal silt began to accumulate. These first people who left their scant remains deep in the Kluane Silt are represented in our collections by the chopper found at Christmas Creek. The other artifacts we found in the Kluane Silt were invariably buried in the upper three to six inches. Even at sites such as 1074 where the provenience is not as precise as one would desire there is no evidence that the tools were anywhere but in the upper zone of the Kluane Silt. Chronological evidence in our excavations consists of the time required for the artifacts to become buried by surface disturbance perhaps due to natural deposition plus possibly the trampling of the occupants. A second significant chronological factor is the time required for the development of the leached profile which followed the occupation. Leaching of soils and the associated development of the colored zones probably took place before the accumulation of Slims River Silt commenced.

The collections made in 1944 and 1948 were too small and too widely distributed among sites in the Kluane Lake basin to permit postulation of culture phases or complexes. Also the absence of adequate comparative material at that time compounded the difficulties of interpretation. On the other hand, the similarity of the provenience of all artifacts led us to a tentative opinion that we were dealing with a single culture "tradition" which existed in the region during an appreciable period of time. This commenced with the onset of the amelioration of climate in an environment characterized by grassland and tundra vegetation. Lack of evidence originally led us reluctantly and incredulously to an opinion that this tradition disappeared or moved away about the time of the beginning of the Hypsithermal. The site at 1085 does not fit this interpretation. There were nine artifacts excavated from a layer of sand lying upon the Kluane Silt but below the ash layer. None of the tools are especially diagnostic of any phase. However, the single Milnesand point may, if MacNeish's discoveries are at all definitive, indicate that the site was occupied by Taye Lake Complex people or even earlier groups reaching back perhaps to the time of the Little Arm complex. This is not compatible with the location of the Little Arm and Gladstone complexes in the Kluane Silt. This site, unfortunately is anomalous in the region and it is easily conceivable that unusual conditions controlling the deposition of silts and sands are responsible. This could easily explain the suggestion that materials identified as early by MacNeish lasted much longer in the region than all other evidence would indicate.

At the very end of our field work the welcome discovery of the sites at Burwash provided evidence that our opinion concerning the discontinuous occupation of the region would have to be revised. These sites had been occupied after the beginning of the deposition of the Slims River Silt. MacNeish has added greatly to the knowledge of this occupation.

The sites we excavated in the Dezadeash Valley led to quite comparable and equally tentative opinions. The artifacts from site 1013 located on a beach of Lake Alsek were obviously early. This material belonged, we thought, in the same tradition as the material from the Kluane Silt. The sites at Canyon and the localities at Champagne, because of their topographic position, because they were buried beneath the volcanic ash, and because of other characteristics, appeared to be approximately contemporaneous, and both of them were certainly later than the site at 1013 and those in the Kluane Silt. However, the Canyon site material had some elements of our "Kluane Tradition" and Champagne had little in common with this tradition. Here comparable but not identical kinds of artifacts led to a suspicion that another tradition was involved. All this material was believed to be of Hypsithermal or older age but just how old we could not say.

These preliminary opinions continue to be useful even in the face of MacNeish's extensive excavations and significant comparisons and interpretations. He has divided our "Kluane Tradition" into four complexes: Kluane, Champagne, Little Arm and Gladstone. This is the privilege if

not the duty of an avowed "splitter" and we have no fundamental objections. As MacNeish has said repeatedly only additional excavations and many more specimens will confirm the postulated complexes or recombine them in some unforeseen fashion. One of the major problems is to establish more precisely the details of the process of deposition of soils in this region. This is complex when controlled solely by natural forces. When the process is supplemented by the unpredictable activities of humans on an occupied site the complexities are compounded many times and in many different ways. We are not always sure that the position of some of the artifacts in the wind-blown soils at some of the sites can be so precisely interpreted relative to stratigraphy and chronology as MacNeish would have them. We will agree that the Kluane complex may well stand as an early one. We suspect, however, that the Little Arm and Gladstone complexes may be closer together, at least in the ground, than MacNeish indicates. It is further possible that the Champagne complex should remain an even more tentative formulation than MacNeish would have it until better definition is possible. These gratuitous opinions are based in large measure on the observation that the details of the deposition of the Kluane Silt and the lake deposits and sand dunes in the Dezadeash-Shakwak Valleys are very incompletely known. Despite these rather conservative remarks we find MacNeish's interpretations significant and very useful. He has had the temerity to set forth a series of working hypotheses. These are based on whatever data may be available, and these at times are exceedingly scarce and widely scattered.

Returning to the Kluane Lake basin and the observation that it was occupied as soon as the land was free of ice, people lived in this basin during the accumulation of the Kluane Silt. There is now proof that human life continued, carrying with it a culture which was somewhat modified, throughout the Hypsithermal and following it after the deposition of Slims River Silt commenced. In the part of this long time interval which was prior to the Hypsithermal period, the great lake in the Dezadeash and tributary valleys, at least as far east as Champagne and perhaps much farther, was an impassable barrier to the inhabitants. This was probably not serious because these nomadic hunters probably preferred to travel and hunt along the mountain slopes and ridges leading up from the lake. These areas, especially the unglaciated slopes of the Yukon plateau undoubtedly supported a plentiful supply of grazing animals such as musk ox, caribou, and possibly bison and elk. The lowest level in the Dezadeash Valley at which their tools have been found is just above the beach at mile 1013, though this probably represents the later part of their occupation of the Shakwak Valley.

The successors to these early hunters occupied the Dezadeash basin after it was drained at the beginning of the Hypsithermal period. Their remains are found in silty sands beneath the volcanic ash but over the ancient lacustrine deposits at the Champagne sites 1, 2, and 3, at the Canyon site, and at a number of small surface sites which we have not described in detail.

There is good coincidence, therefore, between the geographic distribution of the archaeological sites and the ages of the land surface, whether the latter were dated by the beginning and ending of aeolian silt deposits or by the advance and retreat of lakes. Further, the human occupants practicing a culture modified through time by processes of development and diffusion have lived here during a long period of immigration of plants and animals, and during developmental sequences in the land forms and biota that produced major changes in the landscape.

There is every evidence that the people were hunters and lived primarily on game. Fishing, we believe, was secondary in this circumscribed region. The abundance and kind of game would be determined in large measure by whether the vegetation was primarily forest or primarily heath and herbaceous vegetation of low stature containing mosses, lichens and grass-like plants. These criteria would determine whether the game was of rodents and grazing animals such as caribou, bison, musk ox, elk, or antelope; or whether it was of browsing animals, such as the moose which lives there today. Consequently, the basic problem with which we are faced is the determination of whether or not there were forests in the valley while the ancient people lived there. And if forests were not present, at least in quantity, what kind of vegetation was there, and when did the present forests appear?

If our analysis of land surface history is correct, direct physical evidence of the vegetation during the critical period is to be looked for in the Kluane Silt of the Kluane Lake basin, and in the lowermost part of the Slims River Silt. In the Dezadeash Valley it can be looked for only in deposits above the post-Hypsithermal lake which stood at about 2,120 feet, as at the beach at mile 1013. The upper surface of the profile in which it can be found, except in obviously redeposited material, is marked approximately by the deposit of volcanic ash.

We examined hundreds of profiles in both the Kluane and younger silts, and were by no means limited to those exposed by our own efforts. Relatively fresh exposures were abundant in road cuts and barrow pits along the Alaska Highway. The Kluane and Slims River Silts are exposed in hundreds of miles of steep bluffs on the shores of Kluane Lake and on the borders of the many outwash fans that come down to its shores.

ANCIENT TUNDRA-GRASSLAND IN THE DEZADEASH AND SHAKWAK VALLEYS

The evidence we have accumulated, negative though most of it is, indicates that there were no continuous forests in the Shakwak and neighboring valleys until after the Hypsithermal period.

Forests and grasslands now exist side by side in the Dezadeash and Shakwak Valleys, though the former are clearly in the ascendancy. At present there are almost no grazing animals, though there may have been a few caribou before the coming of the white man in the last century. The principal game animals now are moose and bear. That a small number of grazing animals can thrive, however, is proved by the fact that for many years the people at Burwash wintered their horses merely by turning them loose to shift for themselves (cf. also Kindle, 1953, p. 5). The only large grazing areas the region now affords are in the tundra, high in the mountains and difficult of access unless horses are available for transport. Caribou and sheep are abundant in some of the mountain country. Goats are also to be found in the mountains.

The great simplicity of the forests suggests that they have recently arrived in the valleys. The lodgepole pines, at mile 982, are not stunted hangers-on at the margin of a range, but large healthy trees in a well-formed stand. One has the impression that the only reason apparently identical sites west of this point do not have pines is that their seeds have not yet reached there. Griggs (1934) presented a great deal of evidence for recent advance of forest in southwestern Alaska, and Porsild (1951) proposed that much of the forest on the western slopes of the Mackenzie Mountains along the Canol Road was new and advancing. One can suggest that the forests are recent, but this is meaningless in the present problem until he can suggest how recent.

We have clear evidence that the spruces on the lowest beaches in the Dezadeash basin are the first trees to invade this land since it was exposed by the drainage of the last lake (Fig. 32a). This was the lake that stood at about 1,970 feet (Fig. 6, Lake No. 5). We also found trees on the next higher beaches, at about 2,040 feet which we believe were initial invaders. They were 100-130 years old, 40-50 feet tall, and about 20 inches d.b.h. (Fig. 32b). They were associated with old beach driftwood, often growing in dense piles of it, indicating that no destructive fires have affected the area since the driftwood was deposited. In the Slims River Silt of the Kluane Lake basin we found forest beds containing stumps, partially decayed logs and charred wood down to the level of the volcanic ash, and as noted elsewhere, we came upon living trees that were about 450 years old. All of these data refer to events that are too recent, however, to be significant for the immediate problem. At most they give us suggestions as to the manner in which invasion by forests may have occurred.

A question arises as to whether forests would have been able to

Fig. 32. Forests on old lake shores in the Dezadeash Valley; a burned forest; and a bank of wind blown soil in the Kluane Lake basin. _a_. Forest of white spruce _below_ the ancient lake beach approximately at altitude of 2, 040 feet, vicinity of Bear Creek south of mile 1021 (_Picea glauca_ vars. _albertiana_ and _Porsildii_) (June 27, 1948). _b_. Forest of white spruce _above_ ancient beach approximately at altitude 2, 040 feet, vicinity of Bear Creek south of mile 1021 (_Picea glauca_ vars. _albertiana_ and _Porsildii_). Compare with _a_ and note greater density of trees and ground cover (June 27, 1948). _c_. Burned spruce forest with many trees still standing, though with dry wood and rotted roots; near southwest shore Kluane Lake. Uneven surface is part of esker system near mile 1075 shown in Fig. 14_a_. _d_. Bank of wind blown soil which is comprised of Kluane and Slims River Silt. The prominent ash layer divides the two silts. Both beds of silt show the effects of repeated reworking by the wind. Such banks are common along the southern and eastern shores of Kluane Lake where they receive the full force of the Slims River Valley winds. This view taken about one-half mile north of the Highway on the trail to Christmas Creek (August 12, 1948).


a
b
c
d

flourish in an area in which windblown silt was being deposited. The behavior of the present forests indicates that they could. Clouds of dust now blow about in the valleys, covering the trees and the forest floor (see Fig. 4a). Walking through a thick green mat of mosses in spruce woods, one stirs up dust as though he were on a dusty road, and striking the branches of the trees releases more clouds of silt. Lichens appear to be sensitive to the dust, and are scarce in those parts of the valley where it is most abundant, but the higher plants seem to suffer no ill effects.

Charcoal, as already stated, was found throughout the upper and middle parts of the Kluane Silt. It is most abundant in the upper eight to twelve inches, occurring in small bits and pieces, one-sixteenth to one-quarter inch in diameter, and is scattered through the silt. Occasionally there are small, ill-defined groups of pieces, but most of them are randomly distributed.

Also scattered through the Kluane Silt, mostly in the upper eight to twelve inches, are small pieces of charred wood. None that was much over an inch in diameter was ever found; and the pieces were never associated together in beds, but were isolated from one another. They were commonly found at archaeological sites along with stone tools, suggesting immediate association with human occupance.

Deeply buried in aeolian silty very fine sand on a bluff above Aishihik River near mile 996 we found old roots of balsam poplar. These roots were in situ and were encrusted with a calcium deposit. The silts here had obviously been reworked by wind either during or after their initial deposit, for they were interbedded with thin organic horizons, the "turf layers" of the Canyon 1 site (Fig. 24a, b, c, d). Such organic horizons were found in silts of Kluane age only on bluffs of this kind or in dunes.

From the above observations we conclude that charcoal and wood have been preserved in the Kluane Silts not only throughout at least the latter half of the period of the deposit of the silts, but also throughout the Hypsithermal period in which the leaching of the profile was accomplished. This being the case, it is reasonable to assume that if larger pieces of charred wood or charcoal, such as would inevitably result from a forest fire, had been present they also would have been preserved. Even if most of them had burned, a few should remain -- enough so that at least a few should be found in all the horizontal miles of Kluane silt section that we have seen.

On several occasions we found remains of forest in the Slims River Silt down to the level of the volcanic ash. There were both logs and stumps, the latter both in place and overturned. Some description of such discoveries is included in the account of the Burwash 3 site. Associated with some of these forest beds are horizons of wood ash which evidently marked the occurrence of particularly intense fires. This ash is quite different in texture from the volcanic ash, and is easily distinguished from it. No beds of this kind of naturally occurring wood ash were ever

found in the Kluane Silt, though enough fire was present to produce the small charcoal. MacNeish reports a lens of white wood ash in occupied zones of the Kluane Silt at various sites. It appears highly probable that if beds of the inert wood ash had ever been laid down they would still be there as they are in the archaeological sites. The conclusion is that, given the fire, there must not have been enough wood to make natural ash beds.

To find a possible source for the charcoal now included in the silt we examined other kinds of vegetation that had been burned recently. The best coincidence was found in a comparison with conditions on a dry prairie. The Duke Meadows are on a broad sand and gravel fan that is covered by a thin deposit of Slims River Silt one to four inches thick. It has all been burned over, probably several times. The silt is filled with the living roots of grasses and the other low plants of the prairie. The flora contains a few woody species, notably a trailing heath (Arctostaphylos Uva-ursi), and a few upright willow shrubs three to five feet high. The stems of the heath are rarely more than one-quarter inch in diameter, and most of the willow shoots were less than one inch. Scattered through the silt, among the living roots, were very small flecks of charcoal, but here and there were small cylindrical pieces of about the diameter of a lead pencil. Some of these were only partially coaled. In the silt immediately beneath the larger willows were short pieces, charred or partially so, of about the same diameter as the larger stems now living. Fire kills these willows back to ground level but does not destroy their roots, and they soon sprout up again.

We believe therefore that repeated fires in dry prairies with occasional shrubs in them would have produced the charcoal and charred wood which we find in the Kluane Silt. Further, it would have been distributed through the silt about as we now find it. In spite of the burning of the prairie we could find no beds of ash there, which suggests that none should be expected in the Kluane Silt.

Reference has been made in the above discussions to the reworking of the silts after they were deposited. The areas in which this happened are more or less localized on bluffs or other high surfaces that were exposed to strong winds during and after the period of deposit (Figs. 23c; 32d). Probably only a few of those that exist have been identified, for many are now covered by forest. The most conspicuous and easily seen are on the shores of Kluane Lake, on the margins of gravel outwash fans crossed by the Highway south of the lake, and on the high bluffs that margin the valleys of the Dezadeash River, Marshall Creek, and Aishihik River west of Champagne. The total area involved in these dunes can only be conjectured, but it must have been considerable. Their extent and wide distribution bear out the assumption of a dry climate, especially during the Hypsithermal period, and they suggest the absence of forest over large areas. Forest would have held the soils in place, as it does now, while a dry grassland could have been blown out rather easily, particularly after fire. A striking case illustrating this point is in the

vicinity of mile 1013. Here there are silty sands that lie above a beach which formed the shore of the uppermost of the later Dezadeash Valley lakes. These soils are now covered with forest, but their topography is that of dunes swept by winds from the southwest.

In regions where there has been a long history of occupance by forests one of the most striking physical evidences of this is disturbance of the soil by tree-throw. When a tree falls its root system brings soil materials from depth and dumps them on the surface. Later, the spaces formerly occupied by roots and stump bases may be filled by surface or mixed soils slumping in from above. This process is common in the Dezadeash and Shakwak Valleys at the present time. The spruces, which are the prevalent trees in most of the forests, are shallow rooted, i.e. the main roots, which are capable of bringing up appreciable amounts of soil or leaving appreciable spaces usually are within ten to twelve inches of the surface. The balsam poplars have deeper roots, but they are more or less confined to stream banks, flood plains and outwash gravels. The aspens also have some deeper roots, but they are short-lived trees and apparently never develop to a size large enough to affect the process under consideration. The lodgepole pine may develop a rather deep taproot in sandy soils, but it is of limited range in the easternmost part of our region, as already noted. Judging by what we know of its general range and history, it is probable that this tree has never figured in the forest history of these valleys any more than it does now, and that it is a relative newcomer even in its present area.

Given time enough, in the absence of cataclysmic disturbance, individual trees die of old age or succumb to disease and fall. There is a certain amount of sporadic tree-fall going on constantly, but in the aggregate it is insignificant compared to that due to major disturbance from external factors. In a region as dry as the Shakwak and neighboring interior valleys, where the forests are as highly inflammable as they are, fire is by far the most important of these factors. A common effect of a fire in the forests, which usually is driven by a high wind, is to kill all or most of the trees, burn a few of them, but char the remainder and leave them standing (Fig. 32c). They are then at the mercy of the first high wind, which blows them down and lifts their larger roots from the soil. If the fire burns through the forest more slowly, with less wind driving it, more of the wood is burned and there is a heavier accumulation of ash on the surface of the soil. This ash layer may be formed also by fire running through "brule," that is, through dead trees that have remained for a while after being killed by a previous fire. The trees, either still standing or blown down, are then tinder dry and quickly reduced to ash.

Throughout our study of soil profiles in the Dezadeash and Shakwak Valleys we searched diligently for evidence of the kind of disturbance described above. It was commonly found, but always associated directly with forests that have grown in the Slims River Silts above the volcanic ash horizon. Fig. 33 shows a profile that is an example of this. Here the surface soil materials are composed of forest litter under a rather

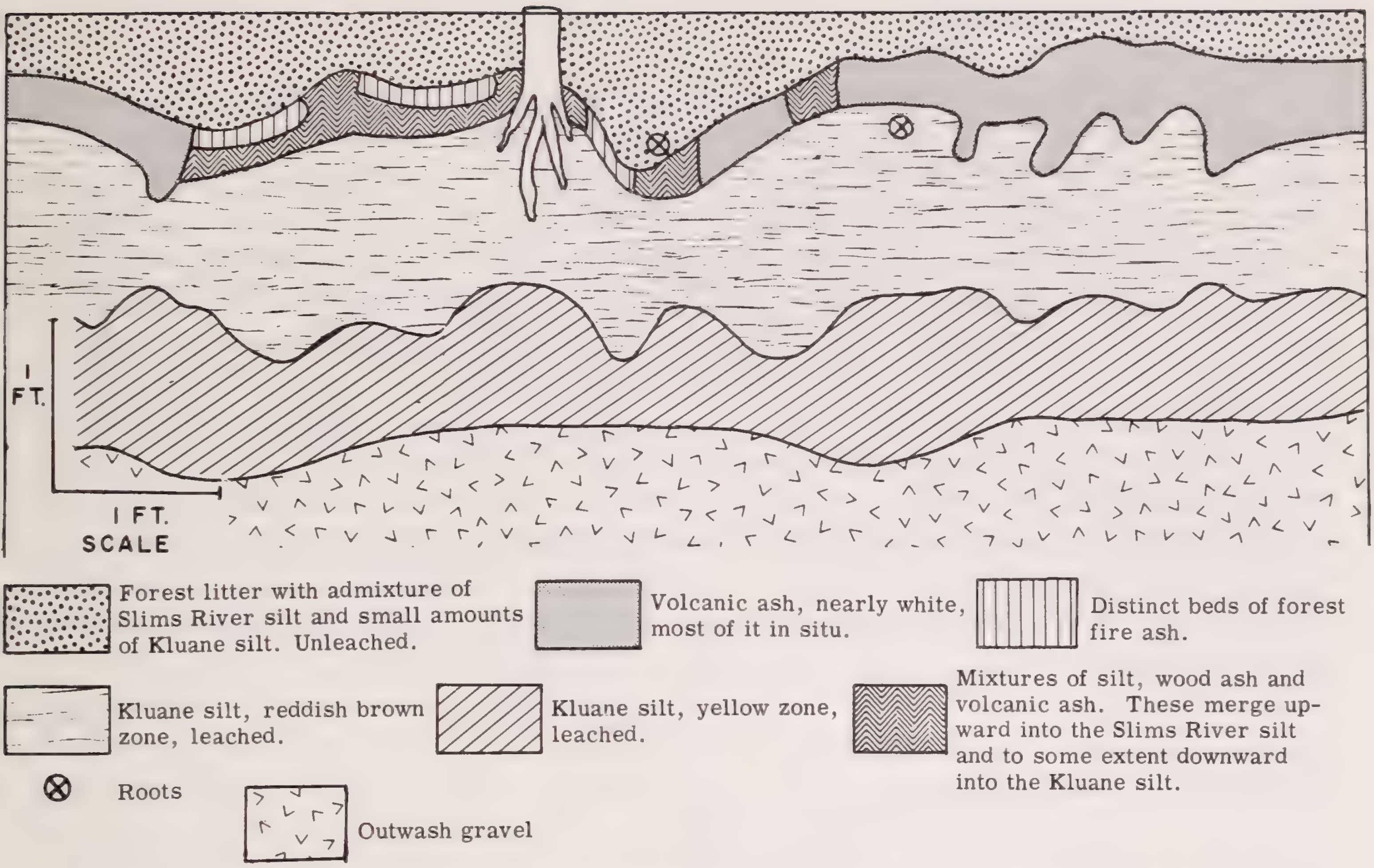

Fig. 33. Profile to illustrate effect of forest fire and tree-throw upon relationships between Slims River Silt, volcanic ash, and Kluane Silt.

open stand of *Picea glauca* var. *albertiana*, with an admixture of ash and grayish, relatively unleached silt. Most of this ash is from fires, but there is a small amount of volcanic ash mixed with it. The volcanic ash layer is much disrupted, and the breaks in it are connected by mixtures of ash and silt. The undisturbed portions are nearly white, indicating that they contain very little silt and are in situ. In the silt above the broken volcanic ash layer are occasional beds of wood ash, also discontinuous horizontally. In general the percentage of ash in the gray silt decreases upward. The base of a stump is shown in situ. The lower part of this penetrates below the volcanic ash to a depth of about 5 inches. Thus it is well into the upper part of the Kluane Silt. Had it been pulled out it would have disrupted the Kluane Silt at least to this depth and probably a little deeper. When dissected it was rotting, but when alive it would have been a little longer. This stump has broken the continuity of the volcanic ash by growing through it, and had the tree been overturned a much larger disruption would have resulted. Another possible case of this is illustrated in Fig. 9*b*.

Profiles of this kind indicate clearly that fire and tree-throw have been effective in mixing the surface materials down to the volcanic ash layer. They have only partially destroyed the continuity of this layer, however, leaving large portions of it intact. Where they have disrupted it they have affected the Kluane Silts beneath only to shallow depths (5-6 inches).

Nothing resembling this kind of disturbance was found at greater depths in the Kluane Silt. It was thought for a time that the transition from the reddish brown to the yellowish horizon might have some significance, and this was traced in many profiles. It usually is an irregular boundary, as shown in Fig. 33, but in some cases much more so than shown in this profile. Occasionally long tongues of the yellowish silt project obliquely upward into the reddish brown, or isolated masses of it appear, in section at least, to be included in the latter. Whether these represent displacements of the material after deposit or merely differentials in a pedogenic process is unknown. But if they represent physical movement of the materials, the resulting forms are not those we have come to associate with root penetration and tree-throw. Rather, they resemble solifluction forms. It has already been noted that no beds of wood ash were found in the Kluane Silt except in places where redeposition was obvious.

SUGGESTED HISTORY OF THE VEGETATION

A tentative reconstruction of the vegetational features of the landscape during the long period following the final retreat of glacial ice from the Dezadeash and Shakwak Valleys is as follows. In the Kluane Lake basin there were wide areas of outwash gravel and sand, fresh morainic deposits, and some varved clay on the floor of the valley as well as on its side slopes. Doubtless a few species of tundra plants appeared as soon as bare soil was available to them, if we may judge by the behavior of the present arctic flora. However, no trace of them exists, for we have found no evidence of a vegetation at the contact between the aeolian silts and the underlying tills or outwash.

We presume that immediately they were exposed, these basal deposits began to be covered with the Kluane Silt. The climate probably was somewhat colder than it is now, for the Alsek drainage was still closed, and presumably the mountain glaciers were considerably larger than at present. That there was a vegetation on the silts while at least the upper half of them were being deposited is shown by the presence of charcoal in them. We do not know when people first came into the valley, but the presence of fire suggests that it was at least as early in the period of deposition of the silt as the charcoal appeared. The nature of the charcoal, and the lack of evidence for any other kind of vegetation, suggests that the plant cover throughout the deposition of the Kluane Silt was primarily tundra or grassland. The only exceptions to this for which we have direct evidence are along stream banks where we have found the roots of balsam poplars preserved in the silts. From these we may suggest that at least some parts of the area may have had "gallery forests" containing poplars, willows and even a few spruces on the banks of streams. We found evidence of these, however, only in the Dezadeash Valley, and it may be that they were not present in the Kluane Lake basin.

The glacial tills of the valleys during this period were in all probability undergoing modification by intensive frost heaving and solifluction. They would have produced plant habitats much like those seen now in the tundra at higher altitudes. The vegetation of the valley sides, and of the morainic complexes between Kluane Lake and Jarvis River and near Champagne, was probably a mosaic of grass-sedge meadow or shrub tundra on long well-watered slopes, thin lichen-moss-heath mats on dry slopes and summits, and cotton-grass tussocks in poorly drained sags.

The wide expanses of Kluane Silt deposits that were over outwash or permeable glacial tills were well drained, and must have presented exceedingly dry sites for plants. Their flora would first have contained the more xerophytic elements in the tundra vegetation such as the caespitose grasses, and a few sedges, heaths and willows. The present flora of the Duke Meadows is not far different. Along water courses there would have been larger willows.

Forage for grazing animals probably was abundant in the Kluane Lake basin in this period. The same would have been true for large areas of mountain country far to the north and northwest, for the landscape must have been essentially treeless, and the tundra luxuriant. At the same time there were limited habitats for browsing animals such as the moose.

In the time of deposit of the Kluane Silt only the higher slopes bordering the Dezadeash and connecting valleys were exposed above Glacial Lake Champagne. We presume that they were treeless and covered with tundra like that in the neighborhood of Kluane Lake.

Although the advent of the Hypsithermal period wrought major changes in surface history, its immediate effect upon the vegetation probably was not great. The Kluane Lake basin was no doubt a slightly warmer place in summer, and probably drier. One result of this change would have been more frequent fires in the dry grassy areas, and more freeing of the soil so that it could be blown by the wind. It is not unlikely that much of the reworking of the upper part of the Kluane Silt occurred during this time. Of greatest importance was the drainage of Lake Champagne, and the opening of the whole valley system, during a warm period, to immigration by plants. The newly exposed valley floors were covered with a great variety of soils, and many of them were well watered. For the first time since the disappearance of the ice the Dezadeash and Shakwak Valleys were accessible to the main mass of the boreal forest flora. With the growing warmth and dryness it also offered sites for species of the northwestern plains, and the latter could migrate there by way of the arid valleys of British Columbia and southern Yukon.

We can only conjecture the course of development, using the geographic affinities of the present flora as guide-lines. In doing so it must be borne in mind that the present flora may be to some extent a "relic" of the Hypsithermal.

The first plants to come into the Dezadeash Valley floor probably were a mixture of tundra and forest margin species. They would form grasslands on well- to moderately-drained soils, marshes or bog-like vegetation in swales, and on dry uplands a thin prairie not unlike that on dry silts in the Kluane Lake basin. A few of these species would be derived from western American or Beringian elements, but most would come from the arctic and sub-arctic wide-ranging plants. Gradually, in the drier grasslands, a few of the western plains species would appear, but this would take time, for the distance is great. During the Hypsithermal there may have been more of these than there are now.

The side slopes of the Dezadeash Valley no doubt shifted gradually from a high tundra species content in their flora to a higher percentage of forest margin species, and the same probably occurred on the valley tills in the Kluane basin. But in spite of these changes, the flora as a whole has never lost its strong tundra affinity. Even though the larger proportion of its species grow in the boreal forest region, most of them also grow in the tundra while only a small fraction have more southern relationships.

So far as our present knowledge carries us, no trees came into the Dezadeash and Shakwak Valleys during the Hypsithermal period except along the immediate banks of streams. Grazing probably remained good, and probably was much more extensive than earlier because the prairies of the Dezadeash basin would have become available.

The coming of extensive forests dates from the close of the Hypsithermal, the beginning of deposit of the Slims River Silt, and the damming of the Alsek River to form the first of the post-Hypsithermal lakes. We can only suggest the process of forest invasion. The volcanic ash deposit came early in post-Hypsithermal time and there appear to be wide areas in which it is not disturbed by tree-throw. While profiles with discontinuous volcanic ash horizons are common, they are not abundant when their frequency is compared to that of continuous ones. The latter may be traced for long distances on the lake shore bluffs for instance, or on the borders of the outwash gravel fans south and west of Kluane Lake. Furthermore, the discontinuous ash horizons appear to be somewhat localized on the broad lowlands near the shores of the lake. Fig. 33 was drawn in such a place, where only about one and one-half feet of Kluane Silt had been deposited on a wide, gently sloping gravel plain only a few feet above the present level of Kluane Lake. This deposit was thin enough so that all of it had been leached of carbonates.

These observations suggest that the earliest invasion of forests in the main valley was perhaps by expansion from stream banks and lake shores upward and outward over alluvial or outwash fans. This expansion would send long extensions on similar sites back into the tributary mountain valleys. The areas in the main valleys latest to be occupied may have been, on one hand, the wetter till and colluvial slopes on the valley sides, particularly on the north-facing slopes where solifluction has remained active longest. On the other hand, the forests would be late comers also on upland soils with excessive internal drainage, such as upland deposits of sand, gravel, and many of the aeolian silts. The present distribution of growth rate and quality in the spruces suggests this sequence.

The direction from which the first forests came is conjectural, though it is clear that it was not from the south or southwest. Even though trees of the Pacific slope had a migration route into the Shakwak Valley via the Alsek, at least during Hypsithermal time, there is no floristic evidence that they used it. There is a suggestion in the present distribution of species in the Dezadeash and Shakwak Valleys that the valleys of the Kluane Plateau to the north acquired their forests first, and that the latter then migrated slowly southwestward into the Shakwak. Black spruce and Alaska white birch are both present in these more northern valleys, though they are absent or very rare in the Dezadeash basin and around Kluane Lake. It is not improbable that the slow advance of forest into the Dezadeash-Shakwak Valley, once Glacial Lake Champagne was drained and the land was available, was related to the extreme aridity of these valleys. In the earlier period of its accessibility the aridity of the land

was accentuated by the Hypsithermal climate. Consequently, although a great deal of time may have been available for the migration of trees into the area, the trees may well have remained limited to the few habitats where abundant and well-aerated ground water was accessible to them, such as stream banks and flood-plains. Due to the aridity this state of affairs could well have persisted into the post-Hypsithermal period, and into the time of deposition of the Slims River Silt.

We have no data with which to compare the climate of the Dezadeash and Shakwak Valleys with that of valleys north of them, but we had the impression while traveling in the latter area that the soils were more moist and the vegetation more luxuriant. We saw very little of the dry prairie so common in the Kluane Lake basin, though the valley floors farther north are not much higher in elevation. The beginning of this change can be seen even at the head of Talbot Arm of Kluane Lake, where the valley of Talbot Creek enters the lake basin from the north. Black spruce and Alaska white birch are both present at the head of Talbot Arm and in the forests northward. We can only assume at this point that the "rain shadow" cast by the high mountains between the Shakwak Valley and the Pacific Coast is most effective in the valley itself, and begins to lose its effectiveness a few miles to the northeastward.

In the Dezadeash and Shakwak Valleys the upland well-drained silts, lacustrine sands and morainic deposits were still arid lands, and remained in prairie for a considerable time after the more moist soils had become forested. The trees have encroached upon these grasslands slowly, and there are still areas that remain open. The forests that have managed to invade them are extremely simple, often composed of a single species, the white spruce; and they are open forests, sometimes park-like in aspect.

It is possible that forests would have developed more rapidly had it not been for repeated burning. Evidence in the soils shows that fire has been ubiquitous and frequent, but we have no information on actual frequency of burning for any given area. One has the impression in many places that the forest is now held in check by fire, and that by judicious burning it would be possible to reconstitute grassland over large areas.

The newest forests are, of course, those on the beds of the last post-Hypsithermal Alsek lakes. These have grown up within the memory of the older inhabitants of the region. They were preceded by grassland, which they are now slowly invading.

The advent of forests brought about a major change in the landscape and the life of the Shakwak and tributary valleys. It broke up the continuity of the great tundra-grassland grazing country that had extended over vast areas in central Yukon and Alaska. The tundra proper now became a series of alpine "islands" in a sea of forested valleys. In the Dezadeash and Shakwak Valleys the grazing lands were reduced to openings in the forest, gradually becoming smaller as time went on. A large area in the western part of the Dezadeash basin was occupied by a lake.

The people who first came into the region following the retreat of the

ice must have been hunters whose living would inevitably have come in large measure from the herds of game that fed on the open grasslands. Judging by what we know of the habits of such people as lived in the Great Plains in ancient times, they would have been nomadic hunters, setting up temporary habitations on the shores of rivers and lakes as they followed the game. Here they supplemented their diet with small animals characteristic of the grassland environment, and possibly with some fish. The great change which occurred at the close of Hypsithermal time must have affected the life of these people very greatly indeed. They were driven out of a large portion of the Dezadeash Valley by the lake that formed there. Elsewhere in these valleys the game animals upon which their lives and culture had depended for some thousands of years were replaced by other forms. Methods of hunting that depended upon the presence of large numbers of gregarious grazing animals, visible at a distance in treeless country, gradually became obsolete. The herds were reduced, and the hunters had to travel long distances through rugged forested country to find them. The game animals that came with the forest, the moose and the black bear, required new hunting methods, and did not yield food or hides in the quantity or quality that the grazing herds had done.

These modifications in topography, in climate and in the biota were accompanied by changes in the culture of the people who inhabited the region. Our archaeological work in 1944 revealed none of these changes and, in 1948, we got but a glimpse of the late prehistoric occupation. MacNeish's excavations brought to light much evidence of the people who experienced the cultural change. The last of them certainly were the ancestors of the modern Athapaskan tribes who inhabited the region until overwhelmed by the Russian and English traders and prospectors.

APPENDICES

APPENDIX I

Description of the Artifacts

The original classification of this collection was first modified and used by MacNeish in constructing a primary hypothesis concerning the sequence of culture complexes in northwestern North America (MacNeish, 1957). The specimens were counted and included in the tabulations published. The present classification and description follows this as closely as possible. For this reason we will not clutter the text unduly with continued references to the above. In addition, MacNeish was kind enough to go over the artifacts selected for illustration in order to make certain that the identifications in the present paper were the same as those published in Number 2 of this volume. The collections made in 1944 and 1948 were the result of reconnaissance in a region which had never been investigated archaeologically, and at the time many of the artifacts were somewhat unique or unexpected. The number of specimens is small and certainly they are not fully representative. MacNeish's collection is much more extensive and it comes from a wider region. Because we are supplying largely a record of discovery we do not discuss, as he does, the finer details in the sequence which comes from adding our material to his. The distribution of the artifacts is presented in tabular form in Table 2.

Table 2

Distribution of Types of Artifacts in Sites in the Dezadeash and Shakwak Valleys and in Kluane Lake Basin

		PROJECTILE POINTS										MICRO-BLADES					END SCRAPERS							BIFACES						SIDE SCRAPERS										CORES				
		Agate Basin-Like		Milnesand-like		Lerma -like	Besant	Refugio		Aishihik	Caton-like	Truncated: Rounded End	Truncated: Fragment	Thin Prismatic Blade	Narrow Prismatic Blade Retouched	Crude Microblade	Keeled	Flat Topped		Plano Convex	Ovoid	End of Blade	Thumbnail	Pebble Chopper		Ovoid Biface		Fragment	Chi Tho	Thin Flake Sheared One Edge		Thin Flake, One Edge Chipped	Thin Flake Sheared, Two Edges		Thin Flake, Two Edges Chipped	Thick Flake, One Edge	Utilized Flakes	Irregular Retouch	Spoke Shave-like Edge	Tongue Shaped		Fragment & Unclassifiable	Fort Liard Burin	
		Surface	Excavate	Surface	Excavate	Surface	Surface	Surface	Excavate	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Excavate	Surface	Surface	Excavate	Surface	Surface	Excavate	Surface	Excavate	Surface	Surface	Surface	Excavate	Surface	Surface	Excavate	Surface	Surface	Surface	Excavate	Surface	Surface	Excavate	Surface	Surface	Excavate
	Bear Creek										1							1																										
	Burwash 1																	1																										
	Burwash 4																	1																										
	Cham. Esker																	1																										
JiVs-3	Burwash 3																												2									1						
	Burwash 5																																				1							
JhVq-1	Gladstone	1					2		1									2						1																		1		
	Pine Creek	1																																										
	West Shore																																											
	Little Arm																									1						1												
	1074(1075)	2	2															2	3												4			1			2	5				1		
	1085			1														2	1			1					1		1					1		1								
	1382-83											1								1										1		1			1									
JeVi-1	1013							3				2	1													1				2							1		1	2			1	
JiVs-2	Little Arm	1										2		1	1		1			1										1											1			1
JfVg1,2,3	Canyon	1								1		3				2														3		1				1			1					
JeVc1,2,3	Champagne 1	2		1												1		4								1				2				2					1					
	Champagne 2																									1				1	1													
	Champagne 3																1	5			1		3			1				4		3						1						
	Ptarmigan A					1																																						
	Heart B																											1																
	Xmas Creek																								1											1								

Projectile Points

Agate Basin-Like Points

Little Arm, Fig. 34, no. 1.
Champagne 1, Fig. 39, nos. 7, 8.
1074, Fig. 41, nos. 10, 17, 18, 21.
Gladstone, Fig. 36, no. 1.
Canyon, Fig. 37, no. 6.
Pine Creek Air Strip, Fig. 37, no. 2.

The ten specimens illustrated, with some exceptions, fit the original description fairly well. A variety having a narrow convex base appears as the most common (Fig. 41, nos. 17, 18; Fig. 36, no. 1, Fig. 37, nos. 2, 6). The only nearly whole specimen with this kind of base has distinct convex lateral edges. Fig. 39, nos. 7, 8, are shorter than typical forms, the chipping is a little more crude than expected and they have convex lateral edges. The straight bases are characteristic. Fig. 39, no. 10, lacks its basal portion. It has convex lateral edges, the greatest width being nearer the point making it appear rather more blunt than is characteristic of this class of points. It seems to us that the shape is closer to the Milnesand-like variety or even some other type of point but the chipping is not clearly collateral and not at all suggestive of ripple flaking. This point does not look like no. 21 in the same Figure. The latter point is a finely made one which is collaterally flaked. Though it fits the description of the Agate Basin-like type it does not resemble the points illustrated by MacNeish (1957).

Milnesand-Like Points

Champagne 1, Fig. 39, no. 1.
Canyon, Fig. 38, no. 2.
1085, Fig. 35, no. 7.

This type is represented in our collection only by very small fragments of bases of the points. Lacking more complete examples there is the inevitable uncertainty concerning the presence of this type of projectile point in the collection.

Lerma Point

Mountaintop North of Ptarmigan Heart, Fig. 42, no. 8.

This was the only point of this type found. It belongs in the earliest culture complex, the Kluane Culture, identified by MacNeish. Fig. 17c shows the location of the discovery which is approximately at tree line on the top of a mountain. This lay north of Kluane Lake and is in the drainage of the Nisling River. A small area had lost its vegetation and the surface was eroding away. There was no other evidence of occupation and it

seems obvious that the point was lost by some ancient hunter. It is interesting to note that this was a very old surface which had not been glaciated, at least during the late Pleistocene.

Besant Points

Gladstone, Fig. 35, nos. 4, 8.

Besant points are small with excurvate sides and shallow side notches. The bases are concave. The complete point illustrated and the basal portion of a second were found on the top of the bluff at Gladstone.

Refugio Points

Gladstone, Fig. 35, no. 6.
1013, Fig. 38, no. 1.

The specimen illustrated in Fig. 38, no. 1, has nearly parallel sides and rounded ends. One face has a median ridge and the other face is flaked but it is nearly flat. This flattening seems to have been due at least in part to the use of a thick flake one flat side of which was dressed. The point is retouched in places along the side and around both rounded ends. Perhaps significantly this retouching has been done from the flat side only and can be seen on the face with the median ridge. Description of this type by Suhm and Jelks (1962) includes the statement "...most of these artifacts have what amounts to a stem section set off from the blade...." This and other characteristics mentioned cannot be made out on the point in question. In other words the point bears little resemblance to the form as described from Texas and there is some question whether it is close enough to be called even "Refugio-like."

Fig. 37, no. 6, is a fragment of a point which has a rounded base and sides which are apparently parallel. The two shallow and small notches on the sides are apparently not accidental. Notches such as this have not been mentioned in descriptions of Refugio Points known to us.

Aishihik Points

Canyon, Fig. 37, no. 14.

Catan-like Point

West Bank Bear Creek, Fig. 37, no. 4.

This is a small triangular point with a rounded base. It is roughly chipped out of obsidian. Points similar to this were used by early historic Athabaskan Indians.

Unclassifiable

Seven fragments of points illustrated are not classifiable. Notable is Fig. 34, no. 10, from the Little Arm site. This point lacks its base. It is made from an obsidian blade and is nicely chipped on one side only. Except for smoothing and flattening of the bulb which is at the point, the reverse face is flat and unretouched. Fig. 37, no. 5, even though it is complete cannot be included with any class presently defined. Fig. 36, no. 9, is an unclassifiable arrowpoint which may well be a pointed fragment of a larger tool. The arrowpoint has been reworked on both faces of the basal portion. Fig. 38, no. 14, a mid-section of an obsidian point exhibiting collateral chipping.

Micro-Blades and Polyhedral Cores

As noted by MacNeish, the several kinds of blades come from several types of cores. A sequence of these types of cores and blades may be one key to the chronology in the region. Because micro-blades are very small and the details are difficult to see, an attempt has been made to illustrate them at approximately natural size. It must be emphasized that the other tools in the illustrations are only about half size or even smaller.

Truncated Micro-Blades with Rounded Ends

Little Arm, Fig. 34, nos. 3, 6.
Canyon, Fig. 38, nos. 9, 10, 11.
1013, Fig. 38, nos. 3, 5.
1382, Fig. 42, no. 11.

These are almost identical with the type description in MacNeish (1957). They are relatively long, rectangular blades with two or more irregular ridges on the convex dorsal surface, the surface illustrated. Some specimens appear to have been retouched on one rounded end of the dorsal surface. The ventral surface is flat. Most of these blades exhibit a bulb of percussion on the flat ventral surface, most frequently at the end which was used or retouched. Blades without a bulb may be fragmentary. If not they may be the result of a variant of the technique and they may have come from a slightly different type of core. Whether these finer variations are present or significant is not clear. If true it indicates that both variants of this type of micro-blade occur at the same site and no inference concerning sequence from one kind to another can be made. However, a truly representative collection would permit closer description and permit statistical analysis which might provide significant details.

Thin Prismatic Micro-Blades

Little Arm, Fig. 34, no. 2.

The single specimen of this type in the collection is characteristic of the class. This shows the bulb of percussion on the ventral surface at the pointed end. The edges have not been retouched. The point may have been modified by use.

Crude Micro-Blades

Canyon, Fig. 37, nos. 8, 12.

As do the rest of this class, these crude micro-blades are thin with several ridges on their dorsal surfaces. The ventral surface is flat exhibiting a small bulb of percussion at one end, the lower in the illustrations.

Narrow Prismatic Micro-Blades

Little Arm, Fig. 34, nos. 4, 5.

This fragile specimen measures 3 mm. wide, 1mm. thick and 20 mm. long. It is made from some very fine grained volcanic rock, not obsidian. There is a single median ridge on the dorsal surface. The ventral surface is flat and no evidence of a bulb of percussion can be seen. Number 5 is a view of one edge, the right one of no. 4. The edge has been retouched by shearing on the flat ventral surface (left in no. 5). It does not appear on the dorsal surface.

Polyhedral Cores

Little Arm, Fig. 34, no. 9.
1013, Fig. 38, nos. 8, 9.
Gladstone, Fig. 36, no. 3.

There is one complete polyhedral core in the collection, Fig. 38, no. 8. The end opposite the tip, called the base, is a flat surface which has been a striking platform for removal of the micro-blades. The platform (at the bottom in the illustration) has been crudely dressed and the end where the micro-blades had been removed is very irregular. Tiny chips removed from the edge may be the result of unsuccessful attempts to remove a blade. In other words this may be a discarded core. Characteristically the core is wider than it is thick and the micro-blades have been removed from one side, the right hand one in the illustration. No blades have been removed from the ventral or dorsal surfaces.

Fig. 38, no. 9, is a fragment of a polyhedral core, it being the tip end. Figure 34, no. 9, is also a fragment. The trimmed surface of the

base or platform is illustrated in the latter and it may be seen that the micro-blades were removed from the edge which is at the top.

Figure 36, no. 3, is a crude core from Gladstone. It is about 35 mm. in diameter and from 10 to 20 mm. thick. The surface illustrated exhibits part of the original surface of the stone from which it was made. Attempts to dress the surface are seen at the lower left. The opposing surface is very roughly chipped. Chips of various sizes and shapes have been removed from around the edge. It is doubtful if these were micro-blades.

Figure 41, no. 12, an artifact from 1074, is not truly a polyhedral obsidian core; in fact it may be simply a piece of raw material. However, a few chips have been removed from it and it may have been on its way to becoming an artifact classifiable as a core.

End Scrapers

End scrapers as a whole have one flat face which is the surface of the original chip or blade from which they were made. Only very rarely is this face dressed, if so, the chipping is to make the face as flat as possible. Retouching of end scrapers is always done from this face so that it appears only on the dorsal one. The scraping edge characteristically exhibits "vertical chipping" that is, edges which lie at angles varying between 45 and 90 degrees to the flat face.

Keeled End Scrapers

Little Arm, Fig. 34, no. 12.
Champagne 3, Fig. 40, no. 4.

The keeled end scraper from the Little Arm Site is one of the rectangular varieties. The scraper from Champagne 3 has a straight base but it is very short and the specimen approaches the tear-drop variety. There is a definite longitudinal ridge on the dorsal face of each artifact.

Flat Topped End Scrapers

1085, Fig. 35, nos. 1, 2, 3.
1074, Fig. 41, nos. 1, 2, 19, 20, 23.
Gladstone, Fig. 36, no. 2, 7.
Burwash 1, Fig. 42, no. 1.
Burwash 4, Fig. 42, no. 2.
Bear Creek Terrace, Fig. 37, no. 3.
Champagne 1, Fig. 39, nos. 11, 17, 18, 19.
Champagne 3, Fig. 40, nos. 1, 2, 5, 6, 7, 21.

The common tools are of various shapes and sizes. They all are characterized by the nearly straight or slightly convex scraping edge.

This is usually the broadest part of the tool. The dorsal surface has been dressed until it is roughly flat and commonly nearly parallel to the flat ventral face. The shape varies from rectangular or nearly square to oval, or sub-rhombic, or tear-drop shape. There are some significant specialized varieties.

Figure 41, nos. 1 and 2, each have a small point or spur worked into the right-hand corner of the scraping edge. This is probably a graver point. In no. 1, the spur is made by removal of two tiny chips. Number 2, on the other hand, has a thin fragile right-hand edge which has been "sheared" for about 10 mm. from the point. The shearing as well as the retouching on no. 1 has been done from the dorsal surface and the scars appear on the ventral. They are not seen in the illustration. Number 3 of Fig. 42 is a fragment and not classifiable.

Figure 35, no. 3 is a flat-topped scraper which has been retouched on all edges. The vertical chipping on the scraping edge gives way on both sides to a fine retouch. A number of other scrapers have some sections of the sides retouched but not as extensively as this tool.

Figure 42, no. 1 is unusual in that the scraper was made on a projection of an irregularly shaped flake. Vertical chipping runs across the upper edge and down the left side into and around the notch which may be seen there. This forms a combination scraper and spoke-shave like tool.

Plano Convex End Scrapers

Little Arm, Fig. 34, no. 8.
1383, Fig. 42, no. 12.

Figure 34, no. 8 is a relatively large tool made of a large flake. The ventral surface is flat near the rounded scraping edge and it has been dressed to a roughly flat surface at the pole end. The dorsal surface is convex, having been formed by the removal of large flakes. All edges except for the pole end have been retouched.

Figure 42, no. 12, is a fragment of a large tool which had been made by splitting a pebble. The ventral surface is flat. The dorsal surface is convex and exhibits the exterior surface of the original pebble except around the edges. These have been retouched.

Ovoid End Scraper

Champagne 3, Fig. 40, no. 3.

This scraper belongs in the ovoid class because the dorsal surface has a number of flake scars and the vertical chipping is found along the upper edge and down the left side.

End of Blade Scraper

1085, Fig. 35, no. 6.

This scraper has been made by retouching the vertical chipping on the end of a thick prismatic blade. The striking platform for the blade is not visible.

Thumbnail End Scraper

Champagne 3, Fig. 40, nos. 12, 13, 16.
Champagne 1, Fig. 39, no. 13.

These are small, thin scrapers two of which are triangular and the third rectangular. The dorsal surface is roughly chipped in two cases. The dorsal surface of the third scraper is flat, probably that of the original chip. All edges of no. 12 are retouched but the other two specimens are retouched on the scraping edges only.

Side Scrapers

In this description the major classes of side scrapers set up by MacNeish (1957) have been divided into several sub-groups because it appeared desirable to describe the artifacts more precisely. We differentiate between chipped tools and tools which have sheared edges. This difference in technique has been described previously (Barbieri 1937, 106; Johnson and Neill 1961, 423). Essentially "chipping," to use MacNeish's term, is a pressure retouch which by separate and repeated movements of the tool presses flakes off an edge in order to make it usable for cutting or scraping. In some cases the technique is not distinguishable from retouching by percussion. Shearing, on the other hand, is dressing the edge, usually but not exclusively, of a thin flake by "running the side of a flaking tool across the thin edge at an angle nearly parallel with the face of the specimen, pressing firmly as the tool sweeps along the edge." Sheared edges can be identified by the very small size and regularity of the chips removed and by the lack of points along the edge between the flake scars.

Shearing is a very common technique employed to make various kinds of side scrapers. It has been employed by artisans responsible for all the early sites in the region under consideration. Its character and distribution in these sites do not yet permit inferences concerning sequence or time. The distribution of the technique in the continent as a whole is not known. When mentioned or described it appears to have been one of the earlier techniques. Apparently its use greatly diminished if it did not disappear during the development of early Archaic industries.

Thin Flake Side Scrapers, Sheared One Edge

Little Arm, Fig. 34, no. 13.
1085, Fig. 35, no. 5.
1074, Fig. 41, nos. 6, 11, 22.
1382, Fig. 42, no. 13.
Canyon, Fig. 37, nos. 7, 15, 17.
Champagne 2, Fig. 38, no. 5.
Champagne 1, Fig. 39, nos. 10, 15.
Gladstone, Fig. 39, no. 12.
Champagne 3, Fig. 40, nos. 9, 10, 11, 15.

Inspection of the illustrations will show that thin flake side scrapers are made of flakes of any convenient size and shape. A good example of the variety of these might be in Fig. 34, no. 13; Fig. 41, no. 6; Fig. 39, nos. 10, 15. The edges of these usually delicate tools are either straight or convex. A number of tools having convex sheared edges are listed under "spoke-shave-like edge."

Thin Flake Scrapers, Chipped One Edge

1074, Fig. 41, no. 22.
1382, Fig. 42, no. 9.
Canyon, Fig. 37, no. 16.

Though these side scrapers are made from thin flakes they are more substantial than the sheared specimens. Figure 41, no. 22, is retouched along the upper right-hand portion of the tool as illustrated. The retouching is rather fine but the edge is serrated in a way which is not found on sheared edges. The other two side scrapers illustrated are easily classified as chipped.

Thin Flake Side Scrapers, Sheared Two Edges

1074, Fig. 41, nos. 7, 8.
Champagne 3, Fig. 40, no. 14.

These differ from forms chipped on one edge only because other edges have been sheared. The flakes from which these were made can be sub-rectangular as in Fig. 41, no. 7, or nearly oval, Fig. 41, no. 8. The tool illustrated in Fig. 40, no. 14 may have been broken. The shearing appears on the upper edge and, at the lower left, for a short distance along the edge. The left edge appears to be an accidental fracture.

Thin Flake Side Scrapers, Chipped Two Edges

1382, Fig. 42, no. 14.

The single side scraper of this class has obviously been pressure retouched on the right side. The chipping on the left side is not as clear in the photograph. Determination of the technique can be made only by careful inspection of the tool itself.

Side Scrapers, Thick Flake, Chipped One Edge

1074, Fig. 41, no. 24.
Christmas Creek, Fig. 36, no. 5.
West Side Little Arm, Fig. 36, no. 11.
Burwash 3, Fig. 42, no. 4.
1013, Fig. 38, no. 15.
Champagne 3, Fig. 40, no. 18.

This group of side scrapers exhibits the range of edges retouched by chipping. Finely chipped tools such as Fig. 42, no. 4 and Fig. 38, no. 7 can only be distinguished from sheared ones by careful inspection. The coarser chipped tools such as Fig. 41, no. 24 or Fig. 40, no. 18 are more easily identified. Figure 38, no. 15 is an interesting variation of this class for it appears to have been made by sharpening the edge of a fragment of a chopper.

Side Scrapers, Irregular Retouch

Burwash 5, Fig. 42, no. 3.

This is hardly classifiable; it is perhaps best described as a utilized flake.

Side Scraper, Spoke Shave-like Edge

Canyon, Fig. 37, no. 1.
Champagne 1, Fig. 39, no. 2.

The tool illustrated in Fig. 37, no. 1 has had a notch chipped into the end which is uppermost. The left edge of the tool shows the effect of hard use as a scraper. It has not been purposely chipped. Figure 39, no. 2 is a flat piece of clear obsidian no more than 2 mm. thick. The edge which is uppermost in the illustration has been sheared and a small notch has been worked into it possibly by delicate pressure retouching. This tool is quite different from the thick heavy tool first described.

A variety of the spoke shave-like edge conceivably used for the same purpose is found on a group of scrapers with concave edges. These may be either sheared or chipped. Illustrated tools are listed as follows:

Sheared

Canyon, Fig. 37, nos. 7, 17.
1013, Fig. 38, no. 11.
Champagne 2, Fig. 39, no. 4.

Chipped

1074, Fig. 41, no. 13. (Note that this tool could also be used as a reamer. The point to the left has been purposely formed and sharpened.)
Champagne 1, Fig. 39, no. 16.
Canyon, Fig. 37, no. 13.

Burins

Figure 38, no. 10 is a Fort Liard Burin from site 1013. The flake has a smooth unchipped ventral face which is uneven because of a large bulb of percussion. The flake was removed by a blow at the end opposite the burin platform. The dorsal surface exhibits scars from coarse percussion chipping. The burin platform was prepared by retouching from the ventral surface to form the irregularity on the left-hand corner of the upper edge. Blows here removed narrow blades which were as long as the left side.

Figure 34, no. 7 is a Fort Liard Burin from the Little Arm site. This tool has a flat ventral face. The dorsal face illustrated shows scars of heavy percussion flaking. The edge which is uppermost has been retouched from the center of the projecting portion down the right side into the corner. This retouching appears to have been for the purpose of preparing a platform. The scars of spalls from three blows can be made out. However, the spalls must have been poor ones, possibly because of a bad piece of stone, and the corner formed is not even.

The lower left corner of this same tool is equally interesting. It may be accidental but long spalls may have been removed from the lower edge using the left edge as a platform. A similar and perhaps more convincing example of this kind of work is seen in Fig. 37, no. 7. Here a sheared side scraper has, as its right-hand edge, apparently a dressed platform; from this long very thin spalls may have been removed to form the straight bottom edge. Figure 34, no. 12 is a keeled scraper made of obsidian. In addition, close inspection of the lower right-hand corner reveals that a spall has been removed from the edge. This is a burin-making technique which used the flat base of the scraper as a platform. Whether or not recognition of this technique is justifiable is yet to be established. We recall only one other report of the manufacture of burin-like corners on edges of tools, and this was in a presumably old industry in Ohio (Johnson and Neill, 1961, p. 425).

Biface Tools

Biface Knives

Little Arm, Fig. 34, no. 11.
Gladstone, Fig. 36, no. 10.
Champagne 1, Fig. 39, no. 14.

These rough percussion flaked tools are known only from fragments in this collection.

Oval Biface Tools

1085, Fig. 35, no. 10.
West Side Little Arm, Fig. 36, no. 12.
1013, Fig. 38, no. 12.

The oval shape of these large coarsely chipped biface tools is rarely as perfect as exhibited in Fig. 38, no. 12. They are more commonly irregularly oval in shape.

Choppers

Christmas Creek, Fig. 36, no. 9.
Ptarmigan Heart, Fig. 42, no. 5.
1085, Fig. 35, no. 8.

Figure 36, no. 9 is made by roughly chipping a thick core. The right-hand edge was formed by removing large chips from each side. MacNeish informs us that this is a perfect example of bifaces belonging to his Kluane Culture, the oldest complex in the area.

Figure 35, no. 8 is a much lighter tool but nevertheless it is made of a core-like piece of stone. One edge, the left-hand one illustrated has been formed by removal of chips from both sides. It can hardly be said to be retouched. The ventral face of the core has two sections. The left side is chipped as noted above. The right side is flat. The upper two-thirds of the right-hand edge has been retouched from this flat side. The retouching is unusual for it was probably sheared.

Chi-Thos

1085, Fig. 35, no. 11.
Burwash 3, Fig. 42, nos. 6, 7.

Chi-thos are used principally for working the fat out of skins in the process of tanning them. They are tabular pieces of stone which are battered around the edge with another stone. The purpose is to roughen it. In 1948 the Indians at Kluane Lake preferred this tool to any other when tanning skins. In fact, one was made in our camp to be used in curing a sheep skin. It would be difficult to distinguish some of these tools from stones lying around a camp.

Hammerstone

Champagne 3, Fig. 40, no. 20.

It is curious that this hammerstone was the only one seen. This is a small one which has been well worn, especially on the upper end.

Fig. 34. Artifacts from the Little Arm Site, Kluane Lake Basin: 1. Agate Basin-like projectile point. 2. Thin prismatic micro-blade. 3, 6. Truncated micro-blades. 4, 5. Narrow prismatic micro-blades. 7. Fort Liard burin. 8. Large plano-convex end scraper. 9. Fragment of tongue-shaped polyhedral core. 10. Fragment of projectile point, unclassifiable. 11. Fragment of bifacial knife. 12. Keeled end scraper. 13. Thin flake side scraper, sheared on one edge.
Excavated specimens: 2, 7, 9, 12, 13; surface finds: 1, 3, 4, 5, 6, 8, 10, 11.

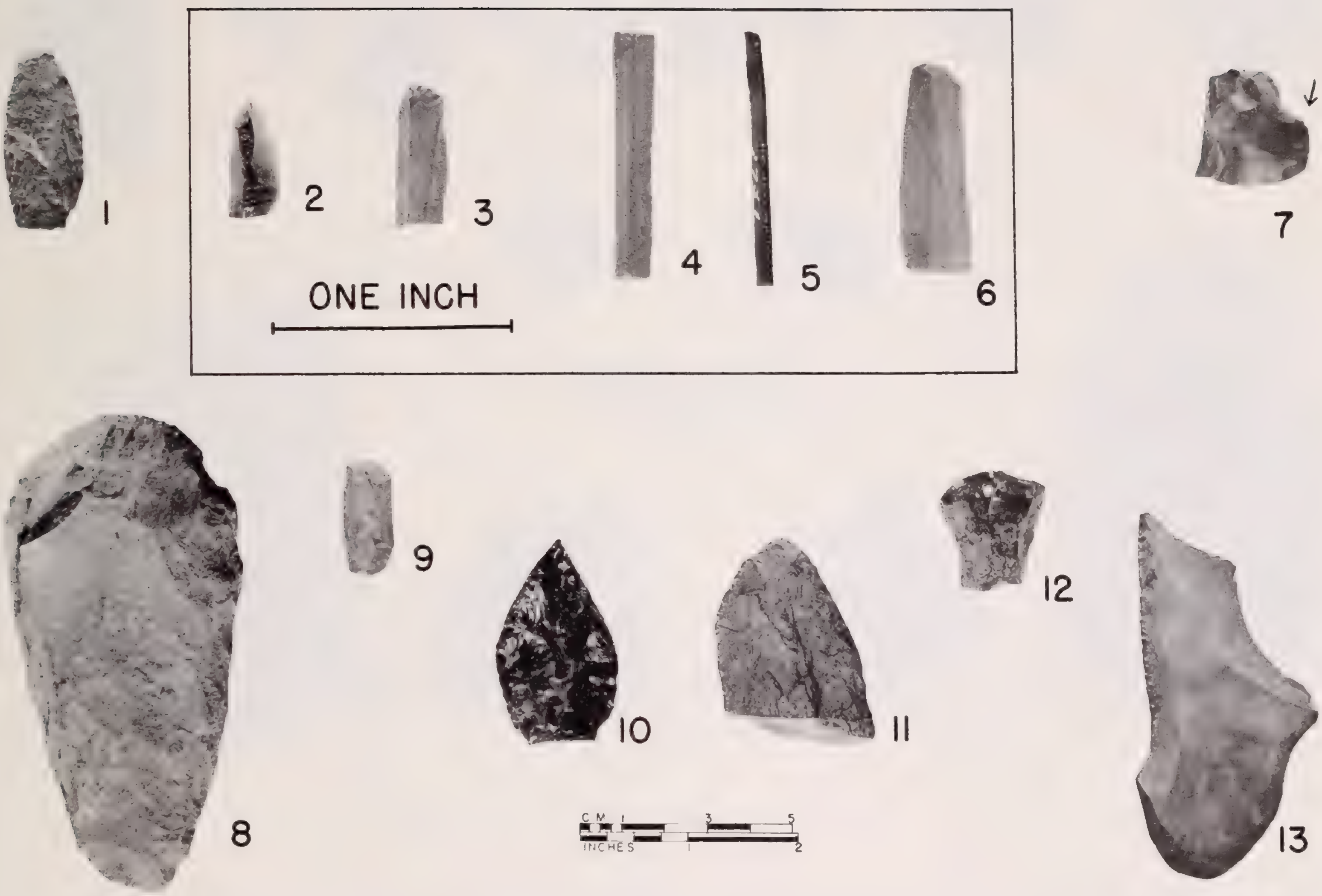

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Fig. 35. Artifacts from sites mile 1085 and 1081, Kluane Lake Basin: 1-3. Flat-topped end scrapers. 4, 9. Fragments projectile points, Fig. 9 is reworked about base. 5. Thin flake side scraper, sheared one edge. 6. End of blade scraper. 7. Fragment Milnesand-like point. 8. Combined chopper and thick flake scraper, sheared one edge. 10. Fragment ovoid biface knife. 11. Chi-tho.
Excavated specimens from 1085: 1, 5; surface finds from 1081: 4.

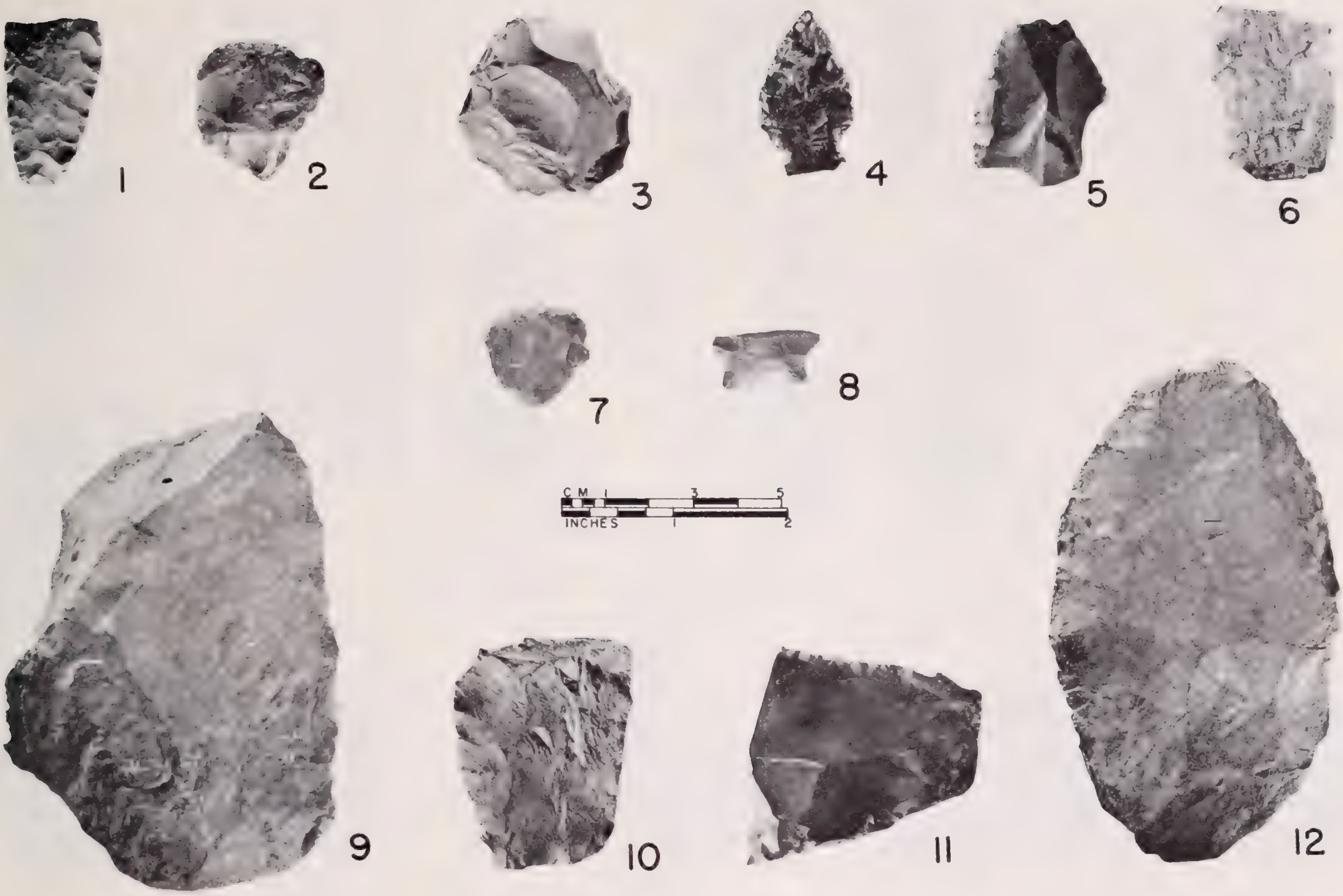

Fig. 36. Artifacts from sites in the Kluane Lake Basin: 1. Fragment of Agate Basin-like point. 2, 7. Flat-topped end scrapers. 3. Fragment of polyhedral core. 4, 8. Besant points. 5. Thick flake side scraper, left edge chipped, right edge chipped by use. 6. Fragment Refugio point. 9. Pebble chopper. 10. Fragment of biface tool. 11. Thick flake end scraper, chipped on one edge. 12. Ovoid biface tool. Specimens from Gladstone site: 1-4, 6-8, 10. Specimens from Christmas Creek site: 5, 9. Specimens from surface, west side of Brooks Arm: 11, 12.

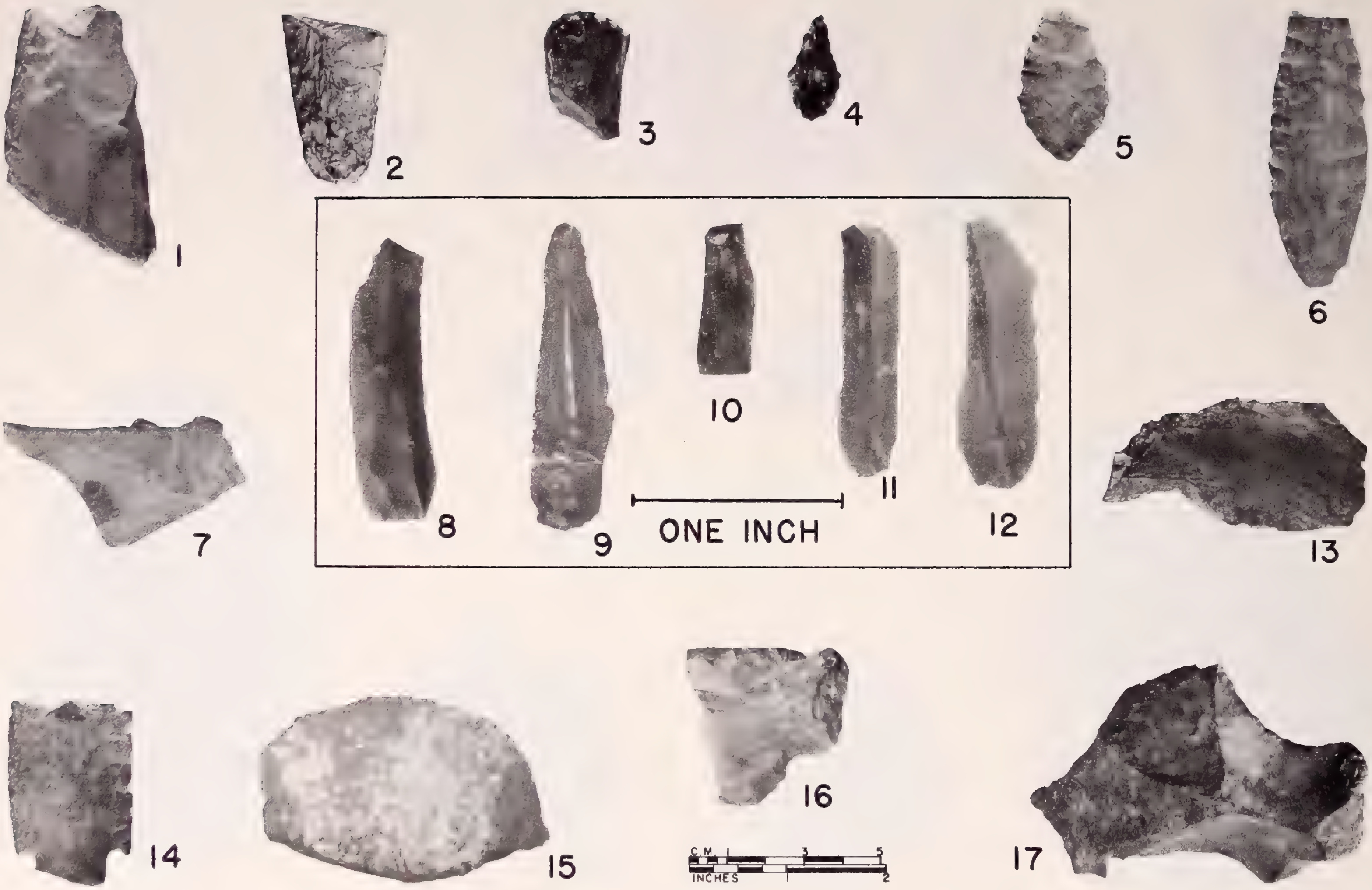

Fig. 37. Artifacts from sites in the Shakwak Valley: 1. Side scraper, spokeshave-like edge. 2, 6. Fragments Agate Basin-like points. 3. Flat-topped end scraper. 4. Catan-like point. 5. Unclassifiable point. 7, 17. Thin flake side scrapers, sheared on one concave edge. 13. thin flake side scraper chipped on two edges, one edge concave. 8, 12. Crude micro-blades. 9-11. Truncated micro-blades. 14. Aishihik point. 15. Thin flake side scraper, sheared one edge. 16. Thin flake side scraper, chipped one edge.
Canyon site: 1, 5-17. Surface near Pine Creek air strip: 2. Bear Creek terrace, west bank: 3, 4.

Fig. 38. Artifacts from site mile 1013, Shakwak Valley: 1. Refugio point. 2. Milnesand-like point. 3, 5. Truncated, rounded end micro-blades. 4. Truncated micro-blade. 6. Utilized flake. 7. Thick flake side scraper, chipped on one edge. 8, 9. Tongue shaped polyhedral cores. Fig. 9 is fragment. 10. Fort Liard burin. 11. Thin flake side scraper, concave edge sheared. 12. Fragment ovoid biface tool. 13. Fragment Agate Basin-like point. 14. Fragment of point, unclassifiable. 15. Thick flake side scraper, chipped on one edge.

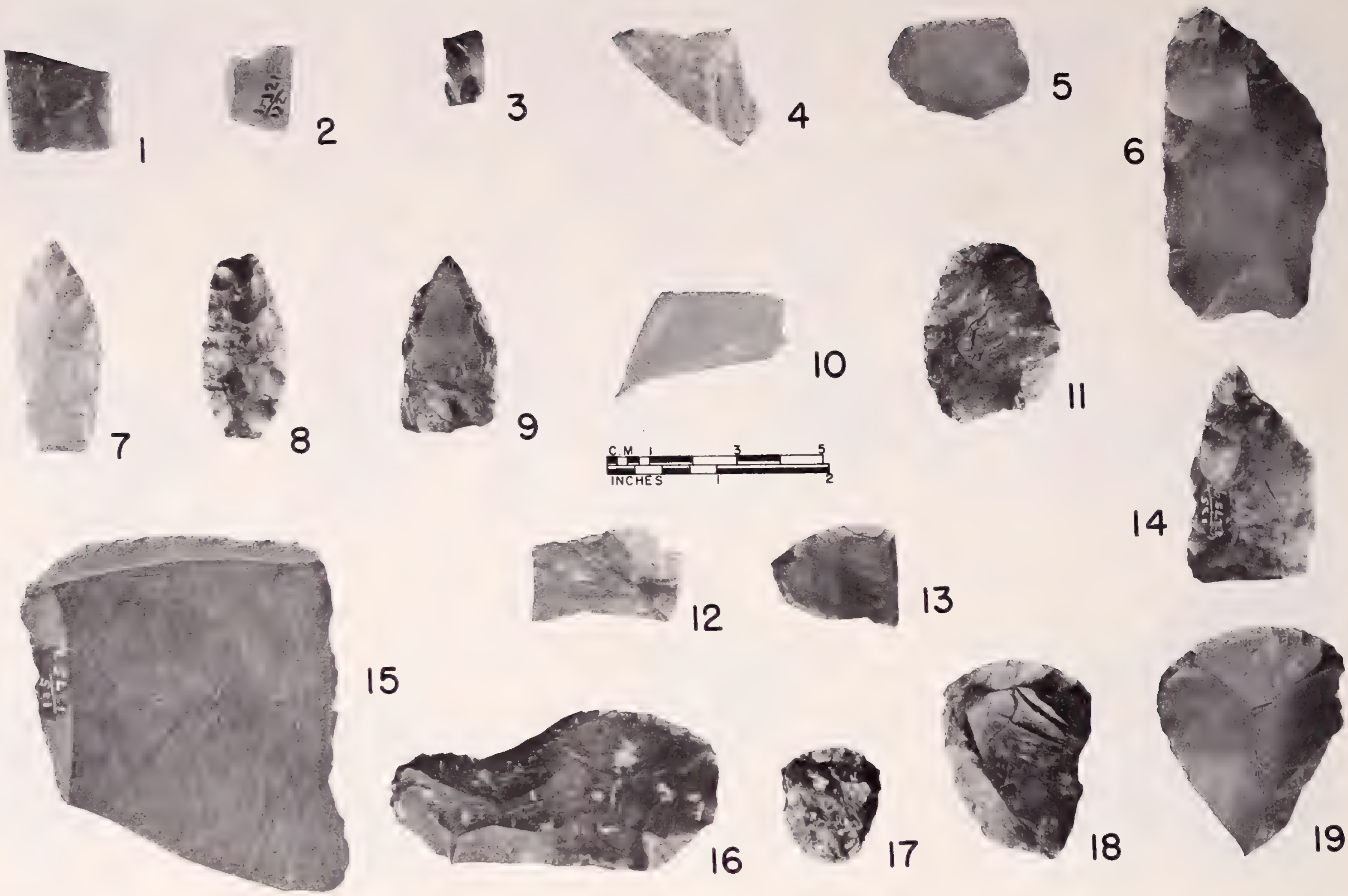

Fig. 39. Artifacts from sites in the Shakwak Valley, and one artifact from the Gladstone site in the Kluane Lake Basin: 1. Fragment of Milnesand point. 2. Thin flake side scraper, sheared spokeshave-like edge. 3. Fragment of prismatic blade. 4, 5, 10, 12, 15. Thin flake side scraper, sheared on one edge. 6, 14. Fragment of biface tool. 7, 8. Agate Basin-like point. 9. Fragment of point, unclassifiable. 11, 17, 18, 19. Flat-topped end scrapers. 13. Thumbnail end scraper. 16. Side scraper, one concave edge chipped. Champagne 1: 1-3, 7-11, 13-19. Champagne 2: 4, 5, 6. Gladstone: 12.

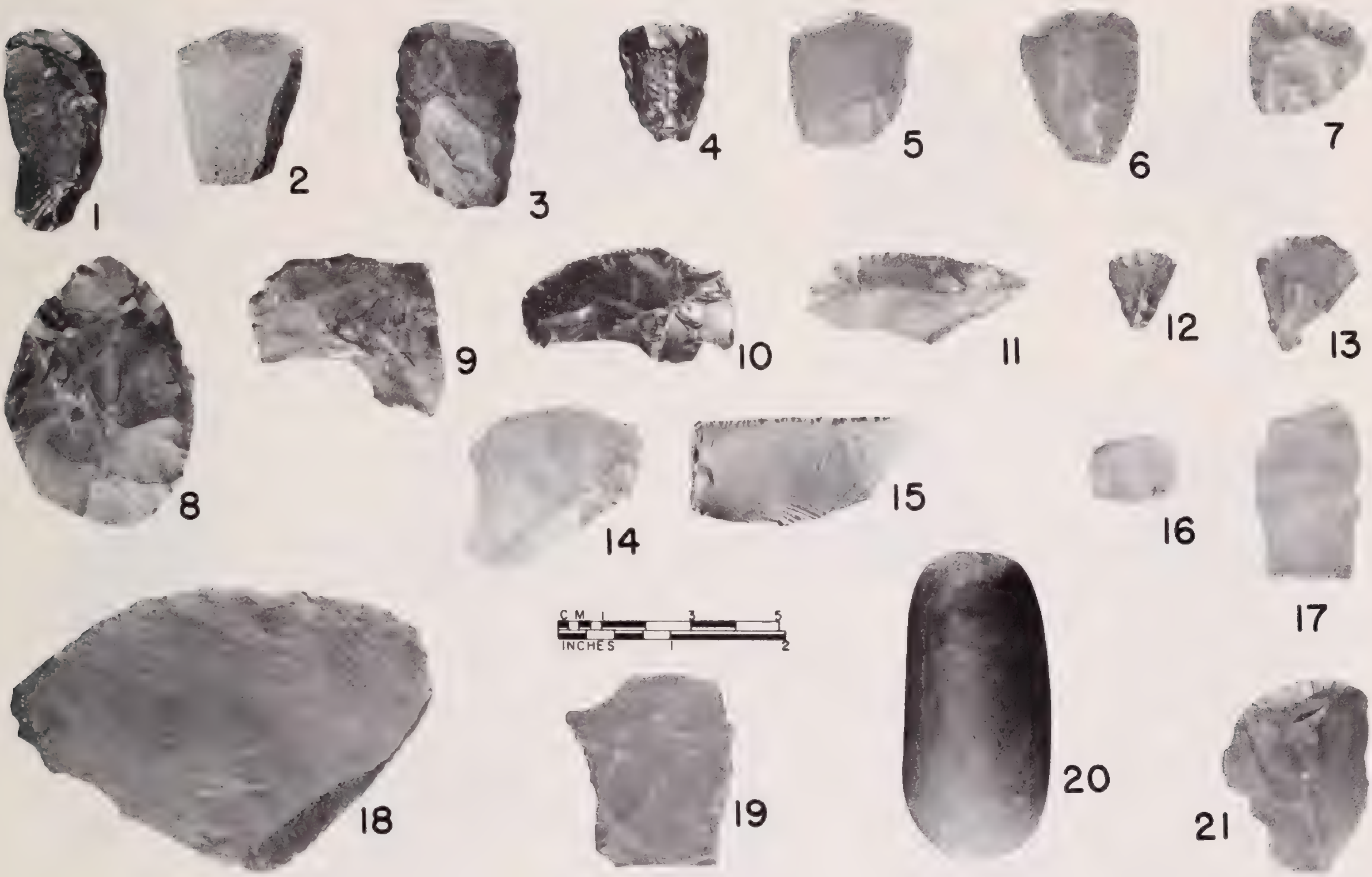

Fig. 40 Artifacts from Champagne 3 site, and Champagne Moraine, Shakwak Valley: 1, 2, 5-7. Flat-topped end scrapers. 3. Ovoid end scraper. 4. Keeled end scraper. 8. Fragment of ovoid biface. 9-11, 15. Side scraper, thin flake, sheared on one edge. 12, 13, 16. Thumbnail end scraper. 14. Side scraper, thin flake, sheared on two edges. 17. Fragment of a projectile point, unclassifiable. 18. Side scraper, thick flake, chipped on one edge. 19. Side scraper, thin flake, sheared on one edge. Note graver point to the left. 20. Hammerstone. 21. Flat-topped end scraper with accidental keel. Champagne 3 includes site number JeVc-4. Specimens from Champagne Moraine: 12, 21.

Fig. 41. Artifacts from site mile 1074, Kluane Lake Basin: 1, 2, 19, 20, 23. Flat-topped end scrapers. 3-5, 9. Retouched flakes, unclassifiable, 6, 11. Thin flake side scrapers, one edge sheared. 6, 8. Thin flake side scrapers, two edges sheared. 10, 17, 18. Fragments Agate Basin-like points. 12. Obsidian core. 13. Side scraper, spokeshave-like edge. 14. Thin flake side scraper, concave edge sheared. 15, 16. Pieces of obsidian, unworked but included in cache. 21. Agate Basin-like point. 22. Thin flake scraper, chipped one edge. 24. Thick flake side scraper, chipped.
Specimens excavated from a cache: 1-16.


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Fig. 42. Artifacts from sites in the Kluane Lake Basin, the Nisling River drainage and in Alaska: 1, 2. Flat-topped end scrapers. 3. Scraper, unclassifiable. 4. Thick flake side scraper, chipped on one edge. 5. Biface chopper. 6, 7. Fragments of Chi-thos. 8. Lerma-like point. 9. Thin flake side scrapers, chipped on one edge. 10. Fragment of projectile point. 11. Truncated, rounded end, micro-blade. 12. Fragment of plano convex end scraper. 13. Thin flake side scraper, sheared on one edge. 14. Thin flake side scraper, sheared two edges. Burwash 1: 1. Burwash 4: 2. Burwash 5: 3. Burwash 3: 4, 6, 7. Ptarmigan Heart in Nisling River drainage: 5. Surface of mountain top north of Ptarmigan Heart: 8. Mile 1382, Alaska: 9-14.


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Fig. 43. Artifacts from sites south of Whitehorse: 1, 10. Thin flake side scraper, sheared on one edge. 2. Fragment of an obsidian biface knife. 3. Fragment of a large ovoid biface tool. 4. Thin polished slate skin-scraper. 5. Thin slate skin-scraper, not polished. 6. Thin flake scraper, chipped on one edge. 7. Fragment of a biface knife. 8, 11. Fragments of large points. 9. Large biface tool. 12, 13, 17. Thick flake side scrapers, chipped on one edge. 14. Base of Milnesand-like point. 15. Fragment of a biface tool. 16. Large oval biface tool. 18. Notched pebble net sinker Squanga Lake: 1, 2, 4, 5. Mill Creek: 3. Muncho Lake: 6. Summit, mile 394: 7-12. Lake Teslin, Ten Mile Creek: 13-18.

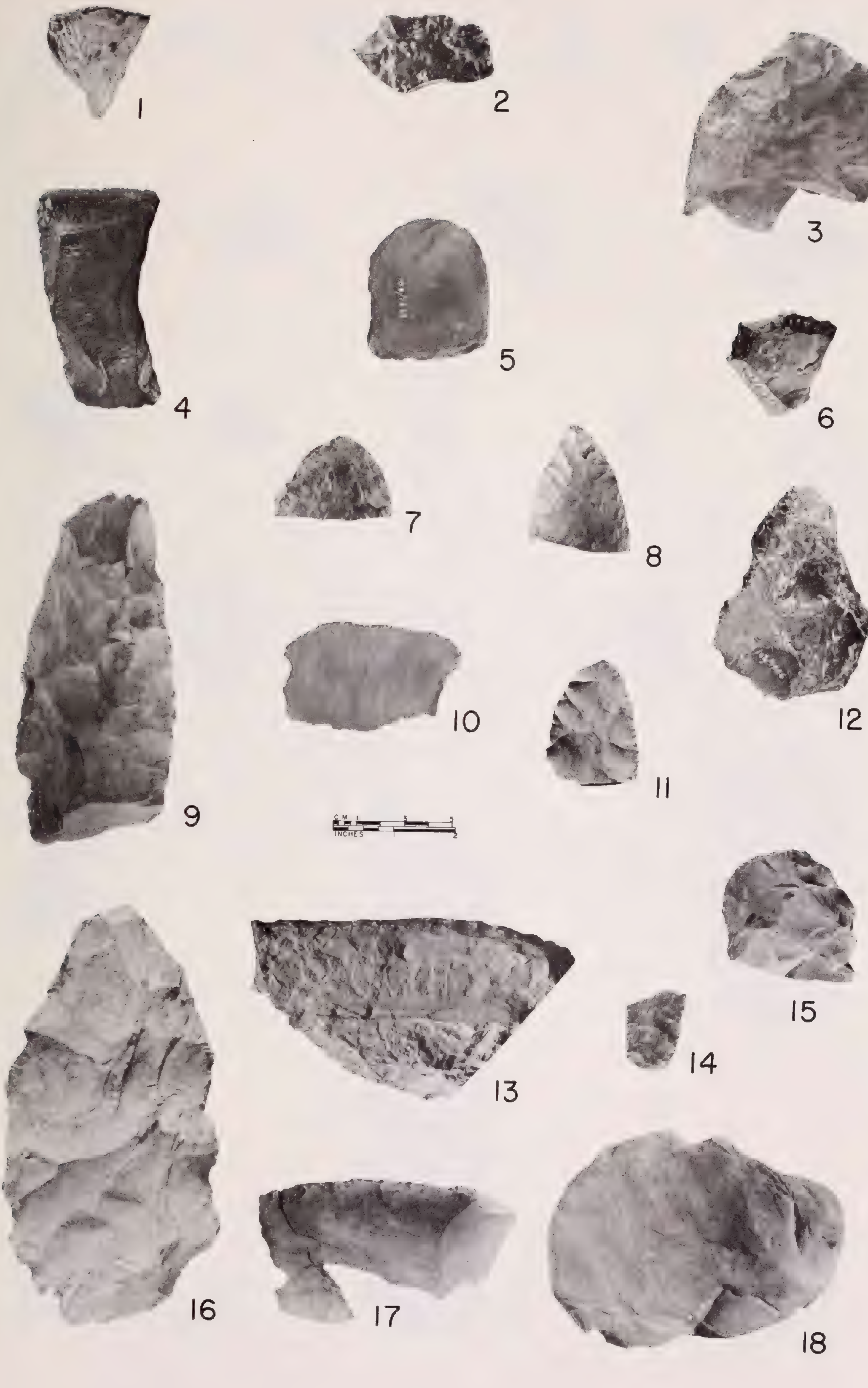
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Fig. 44. Artifacts from sites south of Whitehorse: 1. Thin flake side scraper, chipped on two edges. 2, 3, 5, 11, 12. Thin flake side scraper, chipped on one edge. 4, 9. Flat flake end scraper. 6. Retouched flake. 7, 8. Ovoid end scrapers. 10. Fragment of a biface knife. 13. Crude end scraper of obsidian. 14. Thin flake scraper, convex edge chipped. 15. Keeled end scraper of obsidian. 16. Fragment of a projectile point. 17. Large plano-convex scraper. 18. Fragment of an ovoid biface. 19, 20. Fragments of biface knives. 21. Large flake side scraper, convex edge chipped probably by use. 22. Chi-tho. Used edges are to right and left. 23. Plano-convex core, possibly a crude implement. 24. Large biface tool. About two-thirds of the left lower edge has been dressed by crude chipping from ventral face only. The lower edge may have been used as a hammerstone. 25. Discoidal biface tool. Slightly retouched probably by use on the upper left edge. All tools illustrated are from the Toad River Site, Mile 422. This was named the Callison Site by MacNeish and numbered Ie Sh-1.


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APPENDIX II

Archaeological Reconnaissance between White River and Fairbanks, Alaska, and between Whitehorse, Yukon Territory, and Dawson Creek, Alberta

An archaeological site was found near mile 1382 which is located between the Robertson and Johnson Rivers about four miles west of Berry Creek in Alaska. The site, which was exposed by road building operations, extends intermittently for about one mile to mile post 1383 along the edge of a terrace which varies in height from twelve to about forty feet above the floor of the Tanana River flood plain. The terrace is composed of water-laid gravels, and the bank of the terrace has probably been cut by stream action. The gravels are covered by a layer of silt some eighteen to twenty-four inches thick. This is probably wind-blown. Wind-cut stones were found on the top of the underlying gravel. The wind-blown soil was not found on the floor of the valley.

Artifacts (Fig. 42, nos. 9-14) were found in areas covered with poplar and white spruce where the wind-blown soil was thick. No artifacts were found on the gravels and none were found in areas which are now wet or covered with black spruce. Actually the artifacts found had been disturbed by clearing the edge of the terrace and were not in situ. It was clear, however, that they had been buried in the upper zones of the wind-blown soil. Flecks of charcoal and small patches of ash appeared to be the remnants of human occupation, and this evidence strongly suggests that the surface occupied lies about four inches below the top of the soil.

This site and the chips discovered near mile posts 1367 and 1368 do not contribute greatly to our store of knowledge. Nevertheless, the discovery of micro-blades expands the record of distribution of these tools and suggests a possible continuity in distribution of some early complexes. There is reason to suggest that concentrated work in the Tanana Valley will bring to light evidence of occupation comparable to that found in the Kluane Lake basin.

Sites South of White Horse

The expedition's rapid survey of the Highway between White Horse and Dawson Creek in 1944 resulted in discovery of a number of sites. Some were identified only by chips for lack of time to make a concentrated search. Others produced tools of various kinds. We were especially fortunate to find the site near the Toad River which we called Mile 422. MacNeish followed us to this site which he renamed "The Callison Site." His extensive excavations have been reported (MacNeish, 1957); they

confirm opinions we formed during a frantic lunch hour of collecting (Fig. 44).

Fig. 43 illustrates the representative types of tools found on various sites. The distribution of the sites near lakes and in one or two cases at the top of mountain passes poses geographic problems which should eventually prove to be as significant as the types of tools. We concentrated our attention on the problems in the Shakwak Valley and only present here the illustrations of tools located elsewhere.

APPENDIX III

Notes on the Ethnology of the Kluane Lake Region

The field work of the expedition was concentrated on physiographic investigations and closely related archaeological reconnaissance so that it was impossible to conduct sorely needed ethnological research. We were fortunate, however, in our relations with the Athapaskan Indians living at Burwash Landing near the northwest end of Kluane Lake. These people took a lively and almost personal interest in our discussion and analysis of the botany and physiography of the region. Here, in fact, they found a group of white men who were most unusual for they had objectives to which they were not accustomed. The people from "the States" were trying to understand the country that the Indians and their fathers had hunted over in the same way they did. For a short while archaeology was a little mysterious. The fathers of these people had met the first white men to penetrate this forbidding country, and our companions had first-hand knowledge of native or aboriginal types of artifacts, such as bone- and copper-tipped arrows, spears, skin clothing, cooking by boiling with hot stones, and so on. They still manufacture some of their clothes and tools in ancient patterns for everyday use. However, they had not thought about the situation which had existed prior to the protohistoric period. It was their conviction, for example, that their fathers' families were the first Indians to live in the Kluane Lake region. The demonstration of the antiquity of their antecedents was the occasion for some excitement. When we added to this an artifact inventory which they immediately understood, they gave themselves up to weeks of enthusiastic field investigation and excavation. This, carried on from the point of view of a northern nomadic hunter, was a rewarding personal experience to an archaeologist.

The most we can say for the following notes is that information coming from pleasant conversations was rather haphazardly and incompletely recorded. None of it was collected in formal or arranged interviews, and there may be inaccuracies because the data has not been fully checked. We present the observations as they appear in our notes, making no excuses for possible errors or misunderstandings. It is also unfortunate that we could collect only a relatively small number of specimens and information concerning them.

Practically all our information came from a small group of the Indians who were based at Burwash Landing in 1944 and 1948. Their names are: Jimmy Joe and his sisters Jesse and Mary, the latter being the widow of Louis Jacquot. Also there were Copper Lilly, Mrs. Jimmy Johnson and her son, Sam Johnson. Sam Johnson's wife was extremely shy. She spoke very little English and rarely appeared at our camp, but she made us moccasins to wear and was part of the group. There were two others,

George (last name?) and Jim Watt. George was a quiet man with considerable reserve. Also, there was a minor feud between him and Jimmy Joe which we suspected of originating in some circumstance connected with the clan organization. Jim Watt was a youngster of mixed white and Indian parentage who was the bull cook. He was usually busy with the horses or working for the cook, so we learned little about him.

We were not successful in establishing the tribal affiliations of these people. They were Athapaskans and most probably were part of the tribe Jenness (1932) called Kutchin. Assignment of a tribal designation to these people is as difficult as it was for McKennan in naming the Upper Tanana Indians (1959, p. 17). Like the latter group the people at Burwash are probably part of the Dene branch of the Athapaskan stock. Osgood (1950, Fig. 1) would probably call them Tutchone, reserving Kutchin for a more northerly group. To call them Nehanni, as some would, perpetuates an old confusion between two tribal names which can be traced to prospectors and early travelers who are notoriously careless in such matters. Other names, such as Kluane Indians, Salmon Indians, and so on, are of local usage and not at all definitive. It is impossible to reconcile our fortuitously collected data with the location of the Upper Tanana Indians which has been carefully and much more accurately determined by McKennan (1959, p. 17). That our friends were originally southern and eastern neighbors of these upper Tanana peoples, sometimes called Nabesna, does seem to be a reasonable assumption. At any rate, problems of identification, as well as many others, will be solved by Catherine McClellan who recently has spent considerable time in the region, particularly the winter of 1962-1963.

The people at Burwash Landing have Tlingit-speaking neighbors whom Jenness would probably classify as Tagish. This latter tribe is apparently a recent migrant into the country. There are numbers of Tlingit-speaking peoples at Champagne, Kloo Lake, and Kluckshu in the Shakwak Valley. There is unsubstantiated opinion that Tlingit and Athapaskan are mixed to some extent at Aishihik and very tentatively at Burwash Landing.

The problem of detailed identification was beyond our competence but we may add that there is archaeological evidence in our protohistoric excavations and especially in MacNeish's late material (Bennett Lake Complex) of movements of population bearing different inventories of material culture. This may mark tribal movements, the aboriginal confusion of which was not confounded by Europeans until the time of the 1898 gold rush. This opening of the country actually consisted of a series of "stampedes" to many widely distributed river valleys following the discoveries and claims of prospectors. Many of the claims petered out, sometimes quickly, and the regions rapidly returned nearly to their native state. In the Kluane region the only mine of any consequence in 1948 was Burwash Creek where a small "boat" was washing the gravels. The claims on Sheep Creek and Bullion Creek, tributaries of Slims River, are worked sporadically by sluicing the gravels in single man operations.

The group of Indians we know was born for the most part along the

upper reaches of the Donjek and White Rivers. Mrs. Jimmy Johnson, however, said that she was born on the Yukon River. Jimmy Joe's father, who was Copper Joe, and who died in 1943, was apparently the one person most responsible for the move from the White and Donjek Valleys to Burwash Landing. This move was fostered by Louis and Gene Jacquot.

Burwash Landing was established by Louis and Gene Jacquot about 1904. Though the post was quite important during years of extensive prospecting for gold, it never became famous as, for example, did Dalton Post. Jack Dalton who established the latter spent a great deal of time at Burwash Landing. He was a close friend of the Jacquots. Louis and Gene Jacquot had a fascinating history which can only be sketchily told. They were born in Alsace. According to accounts we heard, Louis answered an advertisement on a lurid poster and went to Canada to work on a farm. This was not successful and eventually he became a pastry cook in Winnipeg. He sent for Gene who joined him as his assistant. They moved to the Needles in California where they made pastry for the Fred Harvey restaurants. When Skookum Jim panned his first gold on the Klondike, leading to the 1898 Gold Rush, Louis went to the Yukon by way of Skagway and the Chilcoot Pass, finally reaching Dawson. Louis began writing Gene for money and at the same time begging him to come to the Yukon which he did in 1900.

Gene's search for Louis is a long and complicated tale in which one discovers that a sister Louise had found her way to Skagway and eventually to Dyea. Another member of the family, Edmund, was known to have lived near South Bend, Indiana, about 1900, but the family in the Yukon lost all trace of him. At last, however, Gene found a letter he had written Louis in Dyea. It contained $200.00 and in retrieving this Gene acquired a little capital so that he could continue his search. One winter's day, Gene with a minister, and three others left Skagway on foot, backpacking their grub and belongings, bound towards Whitehorse. Apparently, the minister was inspired with great missionary zeal for he commenced immediately to force the gospel upon this group of prospectors and adventurers. They were made to get down on their knees and pray which was an unpopular activity. His preaching gave rise to a number of amusing, if blasphemous, incidents along the trail. They did reach Whitehorse and Gene got a job as cook on a scow which was transporting cattle to Dawson. He finally reached that roaring town and at long last found his brother Louis.

The two of them joined the Burwash Creek stampede and worked a "side hill"claim all one winter. At the same time they cooked under contract for a mining outfit. They were put off their claim by someone who had a "rim to rim" claim which held precedence over the Jacquot claim. The cooking contract did maintain them and made it possible in the end to set up the trading post and settlement at Burwash Landing.

The Jacquots were shrewd and intelligent men and Burwash prospered not only because of this but because it was the only successful

Fig. 45. Burwash Landing, and log cabins on Talbot Arm and Lake Creek. a. View northerly over cabins of trading post at Burwash Landing, Kluane Lake (August 25, 1944). b. Trapper's cabin at head of Talbot Arm, Kluane Lake (August 20, 1944). c. Excavating floor of north cabin on Lake Creek near mile 1186 (August 23, 1944).


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post in a vast region. Another settlement at the head of Kluane Lake was never successful. There were posts to the south at Bear Creek, Champagne, and other locations in the Shakwak Valley but they were concerned with the region to the south and toward the coast. The influence of Burwash to the north included the Donjek and White River Valleys. To the east, Indians from Burwash roamed as far as Tincup Lake and into the Nisling River Valley. The relation between Burwash and Aishihik is unknown except that the Aishihik people did most of their trading at Burwash at least until the Alaska Highway was built. Even so, in 1948, Albert Isaacs brought his family (or clan?) to Kluane Lake and to trade at Burwash. There was apparently considerable trade between Carmacks on the Yukon and Burwash. This latter came over a reputedly ancient trail which was detoured after 1900 to the northeastern shore of Kluane Lake, across which goods and people and, as a matter of fact, cattle were transported in distinctly homemade boats. A story, possibly apocryphal, that Louis used a picture on a calendar as the source of the design of one boat could, from our experiences in her, be true. A crankier craft than the "Josephine" could not be built.

The major contact that Burwash Landing had with the outside was through Whitehorse. Very early the Jacquots developed a string of forty or fifty splendid pack horses which fed themselves the year round by grazing in the natural grasslands of the countryside. At first the horses were used to pack supplies from Whitehorse to Christmas Creek near the south end of the lake where the Jacquots established a cache. Goods were then shipped down the lake in boats. The trail was slowly improved so that wagons and finally trucks could be used. The Alaska Highway followed much of this route. At Kluane Lake the Alaska Highway was built by the engineers not without major difficulties along the southwest shore. These developments of a transportation route rendered the relation with Carmacks obsolete. The advent of the Highway tied Burwash Landing closely to Whitehorse and resulted in far-reaching economic and sociological changes (Fig. 45a).

The pack train was maintained and eventually became the backbone of a very fine sport-hunting business. This prospered under Gene Jacquot who cooked and managed the parties which came largely from the United States, and Great Britain. The business is said to continue in modified form.

Early in the history of Burwash Landing trading with the Indians for furs resulted in its becoming one of the summer stops made by the Indians in their annual seasonal cycle. They lived in tents at first, but very shortly the Jacquots built simple log cabins for the several families involved. Stimulated by the Jacquots, the Indians began building log cabins in various strategic locations. Such a cabin was located at the head of the Talbot Arm (Fig. 45b). Opinions concerning whom this cabin was built for are confusing. Apparently, the Jacquots lived there upon occasion, and during several but not consecutive winters previous to 1948 it had been occupied by Moose Johnson and his family. A similar cabin was

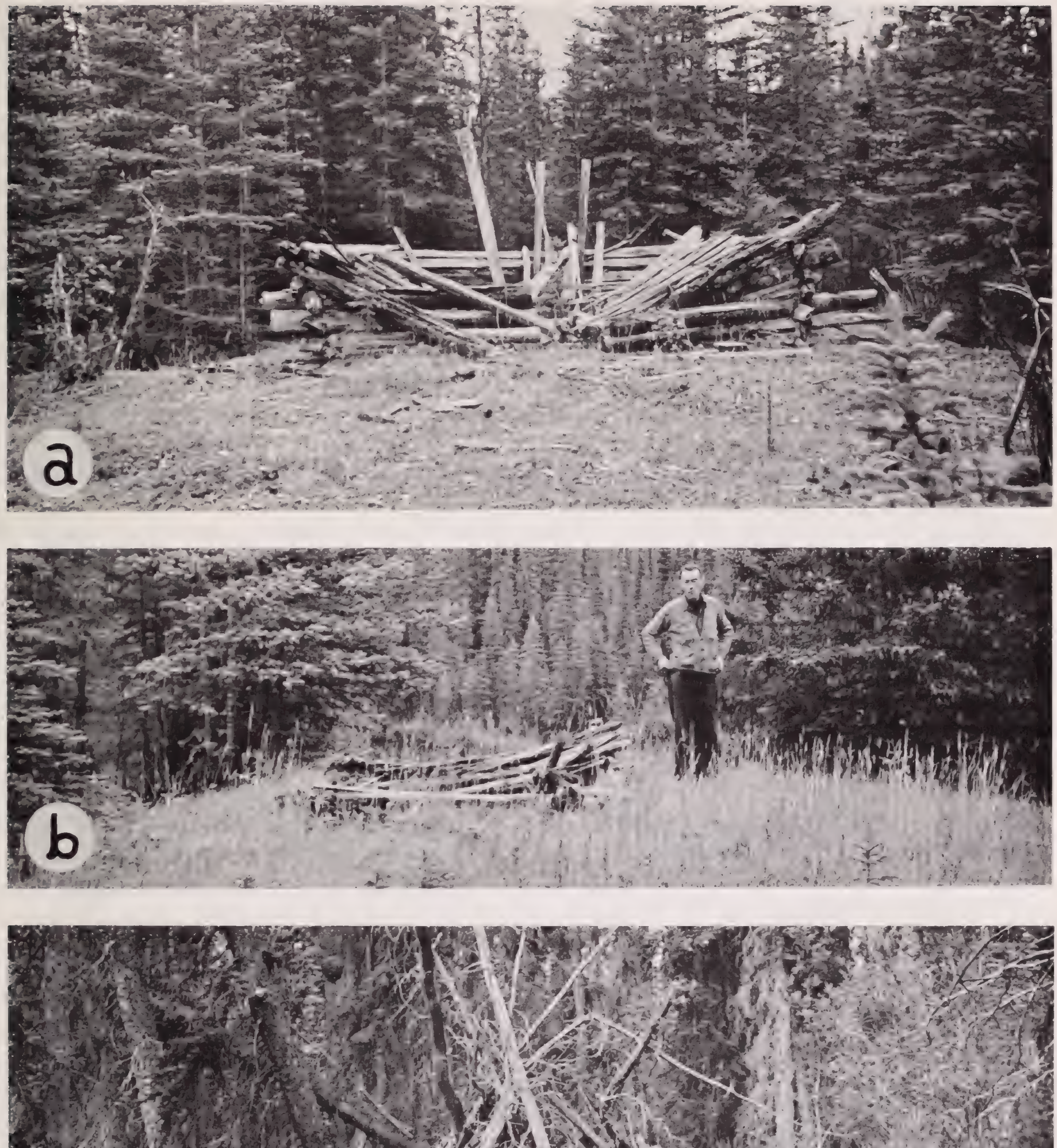
located in the Ptarmigan Heart Valley, on a section of the headwaters of the Nisling River. This cabin was built by Sam Johnson's father assisted by Moose Johnson, "who is not related." Such cabins were built during the period when there was a demand for fur, especially fox skins. Foxes were plentiful in the Ptarmigan Heart Valley. The fur business collapsed and the cabin had not been used for years prior to 1948 when we camped there. Sam Johnson told us that he had never lived there because the locations of his camps were "far away." He hunted somewhere down the Kluane River.

No one at Burwash Landing knew who built or lived in the Lake Creek Cabins about fifty miles to the northwest. These were located near mile 1146 on the Alaska Highway. Lake Creek parallels the Highway on the south, the north cabin (Fig. 45c) being on the north bank between the Creek and the Highway. The south cabin (Fig. 46a), the remains of a cache (Fig. 46b) and a large brush camp had been built across the Creek on the south bank. The cabins were about twelve feet square. Walls, four feet or more high, had been made of logs six to eight inches in diameter. The logs were notched to fit at the corners and the ends projected beyond them. Inside, most of the logs had been hewed to a flat face. There was a doorway to one side of the center of one wall. It appeared to have been made simply by putting in short logs. Framing or other support was not seen. No door was found.

The simple gable roofs were made of small poles extending from the edges of the walls to ridge poles. The latter were supported on two vertical poles having shallow notches cut in the ends. On the front, that is, the wall with the door, and the back the space in the gable above the log wall may have been filled in with small poles. The character of these structures was strange to the Indians who helped us, and this manner of closing the front and back was unknown to them. However, although there were enough poles available in the ruins for this purpose, the condition of the structures was so poor that this use of them could not be definitely determined. The cracks between the logs of the walls were chinked with moss, and from the amount of debris and its location on the floors we believe that the roofs had been covered thinly with sod and moss.

Excavation of the floors of the cabins showed that when built the original turf and moss had been removed, exposing the layer of volcanic ash which is about twelve inches thick in this region. This was covered with a layer of spruce boughs. Fireplaces were located in the centers of the floors but unfortunately they were not fully described in the notes. We do not recall prepared, or stoned up, hearths. Rather, it seems that the fireplaces were simply cleared areas in which fires were built. A few pebbles nearby and found in other sections of the floors were said to be used for boiling. They were heated and dropped into moose stomachs containing food. Beds of spruce boughs had been made on the floors all around the walls. There were, also, remains of built-up racks in places around the walls and there were remains of other racks which were said by our Indian companions to have hung from the roofs. On a

Fig. 46. Old house and cache ruins, on Lake Creek and Duke Meadow. a. Ruins of south cabin on Lake Creek, near mile 1186 (August 23, 1944). b. Ruins of cache on Lake Creek near mile 1186 (August 23, 1944). c. Ruins of house no. 3 on Duke Meadow. Jimmy Joe stands in the doorway (July 29, 1948).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wall of the north cabin small pictographs had been painted in red. They were stylized animals. These were carefully photographed for the record, but all that came out were beautiful details of the hewed surface of the log on which they were painted. The partly decayed mass of boughs, needles, and such debris that formed the floors of these houses included a few artifacts. There was some general rubbish consisting of broken bones of large and small animals. Fragments of burned rock may have been shattered boiling stones. There were pieces of cut birch bark. Stone tools consisted of a whetstone and a fragment of a chi-tho, or skin scraper (Fig. 48b). There was a bone beaming tool (Fig. 48j). A fragment of a trimmed and notched stick (Fig. 47i) was identified by the Indians as the end of a small bow. The function of another wooden artifact (Fig. 47a) could not be determined. A bone comb with incised decorations on both surfaces (Fig. 54c) had teeth on two sides. The sharpened ends of all of these except one had been broken off.

Two iron skin scrapers were included in the debris of the floors. The blade of one of these (Fig. 48h) is longer than the other (Fig. 48g). The latter exhibits the remains of a wooden handle which is not riveted to the blade. No other means of attachment can be seen. It has been suggested that the handle was stuck on the blade with pitch but this cannot be determined. The other scraper has no handle at present, but there is a trace of rotted wood in the rust near the top. There are three drilled holes about one-half inch from the upper edge. These could have been used for riveting, or for lashing a wooden handle to the tool. The edges of the scrapers are curved. They have been smoothed but only the edge of "g" has been beveled at all. Even so, neither of the edges is sharp. The edges have been notched, presumably with a file, the cuts having been made from both sides. Our Indian informants had never seen scrapers such as these and we have not found reference to them in the literature. The closest analogue is the Eskimo hafted stone ulu. Eskimo metal ulus have handles on shanks, as far as we know, and they are not notched. Comparable but not identical notchings along the edge appear on copper skin scrapers which are of a different shape from the Lake Creek specimens; cf. for example, Rainey 1939, Fig. 3, 13. Such notches are also found on some one-handed scrapers made from long bones in various northern regions. We found in the rubbish one empty rifle cartridge. This has stamped on its end W. R. A. Co. 30, N. C. F. Two percussion caps were also in the debris.

A number of glass beads had been lost on the floor. Figure 47c consists of a string of red, blue, and white tubular beads. The red beads have a white interior. The exterior is red transparent glass. These are late varieties of trade beads. The interiors of the blue and the white tubular beads are of the same color as the exteriors. There is also a small string of blue sub-globular beads (Fig. 47d). A third string (Fig. 47j) consists of sub-globular beads which have white interiors and red transparent glass exteriors. A single light blue bead is the only example of its kind. All these beads are common kinds, probably originating

either in Venice or in France. They were used in the fur trade throughout the north during the nineteenth century. They went out of use about the turn of the twentieth century.

The final object to be described is the bowl of a metal spoon (Fig. 47b). The metal may be iron and possibly the spoon had been tinned. At one time the handle had broken off and an attempt had been made to mend it by riveting on a filet of iron. The rivets appear to be made of copper. In the end the patch broke and the handle was lost.

The cache (Fig. 46b) was not investigated in detail for lack of time at the site. It appeared to be a small walled structure four to six feet square. It was probably raised off the ground.

Our archaeologically-minded Indians discovered a group of house ruins on the "Duke Meadow" not more than five miles from Burwash Landing. The Duke Meadow is on the fan and flood plain of the Duke River. Most of this has been abandoned by the river as it has shifted westward. The mouth of the river was once on Kluane Lake itself, some thousands of years ago. But now it has moved so that it joins the Kluane River, the present outlet of the lake, some two and one-half miles west of the lake (Bostock, 1952). The flood plain is a roughly triangular area having a base of about five miles along the lake and the Kluane River and reaching back up the Duke River about four miles. The chronology of the westward shifts of the main channel system of the river can be determined very generally from the vegetation. Sparse grasses and low heaths on recently abandoned areas become denser on the older parts. The latter support willows, and in the oldest parts there are areas of poplar and spruce forests. The relief characteristic of all such areas is not great but the remains of the older channels are clearly marked. Probably the oldest channels are not flooded at all at present. Apparently, however, some of the older parts are still subject to occasional floods during periods of unusually high water.

The community discovered consisted of numerous house ruins. These were not mapped for lack of time. In addition to the houses, remains of "brush camps," or open-top camps as they are sometimes called, were widely distributed. Very roughly, the area which we reconnoitered in some detail was more than one-half mile square. It was covered by a forest the largest trees of which had about 200 annual rings. We identified one group of four houses, Fig. 49a, and another group of six ruins. The first group was near an old channel which even at present occasionally carries water. Along this channel, extending for one-half mile or more were remains of additional houses. There appear to be two types of houses, a pyramidal brush roofed house and a pole or log roofed house.

House number two was an unrecognizable pile of logs and brush, for the structure had been destroyed by a falling tree. House number three was pyramidal in shape (Fig. 46c). The floor was rectangular, measuring fifteen feet generally north and south by ten feet east and west. The apex of the house was about nine feet above ground. The primary framework consisted of three poles three inches in diameter, trimmed of

Fig. 47. Ethnological specimens from the Kluane Lake basin and from the country immediately north of it. a. Wooden object, use unknown; Lake Creek cabin, mile 1186. b. European spoon, Lake Creek cabin, mile 1186. c. Red, blue and white trade beads, Lake Creek cabin. d. Blue sub-globular beads, Lake Creek cabin. e. Piece of cut birch bark, brush camp, Talbot Creek. f. Antler spear point, brush camp Talbot Creek. g. Pointed end of meat roasting stick, brush camp Talbot Creek. h. Pointed end of meat roasting stick, Ptarmigan Heart Valley. i. End of small bow, Lake Creek cabin. j. Sub-globular trade beads with white interiors and red translucent glass exteriors, Lake Creek cabin. k. Sheep horn spoon blank, cabin at head of Talbot Arm. l. Sheep horn spoon, Burwash Landing, Kluane Lake. m. Iron pan, brush camp, Talbot Creek. n. Iron pan, cabin at head of Talbot Arm. o. Wooden paddle used to cover traps with snow, brush camp, Talbot Arm. p. Iron pan, brush camp, Henry Creek, north of Kluane Lake. q. Iron pan, brush camp, Henry Creek. r. Sheep horn ladle, made by Albert Isaacs, Aishihik, north end of Aishihik Lake.


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Fig. 48. a. Chi-tho, Bridge Creek. b. Fragment of a chi-tho, Lake Creek cabin, mile 1186. c. Large chi-tho, brush camp, Henry Creek, north of Kluane Lake. d. Slab of wood, use unknown, brush camp, Talbot Creek. e. End of meat roasting stick, brush camp, Talbot Creek. f. Large chi-tho, brush camp, Talbot Creek. g. Iron skin scraper with wooden handle, Lake Creek cabin. h. Iron skin scraper, Lake Creek cabin. i. Bone beaming tool, Burwash Landing. j. Bone beaming tool, Lake Creek cabin. k-o. Birch bark baskets made by Mrs. Jimmy Johnson, Burwash Landing, August 1948. p. Bone beaming tool, Burwash Landing.


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branches and having crotches at their upper ends. These crotches were locked together and then untrimmed poles were laid against them so that the branches, originally covered with needles, filled in much of the space. On the southwest and northwest sides logs, some of which were split in half, about three inches in diameter and three to four feet long, had been laid against the structure. A doorway was located on the northwest side. This opening was made by arranging the logs and brush laid against the wall. It was triangular in shape and the apex was a little above waist high. The floor of this house lay under a mass of surface litter, duff and some ten inches of fine silt. The floor was marked by a layer of spruce needles which came from spruce bough beds. A fireplace occupied a roughly oval shaped area between the door and a low hole in the opposite wall. This hole may actually have been a second doorway as in the other houses, but it could not be positively identified as such. Presumably, a log was pushed through the doorway and another pushed through the hole to meet it. The fire was located at the ends. This type of fireplace was more clearly seen in house number four (Fig. 49c).

House number one lay twelve feet northeast of house number three. This had a pyramidal roof of poles supported on low log walls. Around the western half of the house a "sill" log, some ten inches in diameter, had been laid down. On top of this there were piled untrimmed spruce logs to make a wall estimated to have been originally four feet high. The north wall was peculiar in that there was not enough wood in the ruin to fill up the space on each side of the door. A tree now fifteen inches in diameter had been incorporated into the south wall to form one side of the doorway. The east wall was made up of courses of logs. At the corners the logs were not notched carefully. Logs were laid alternately from one side and then the other in a real "hog pen" finish. Long poles lay diagonally across the ruin. These were probably rafters which supported a roof of poles some of which may have been laid horizontally. The floor lay under about ten inches of silt, the accumulation from at least two floods. It consisted of spruce boughs which had covered the areas on each side of the fireplace. The latter extended across the house from door to door. Investigations and excavations of this house revealed only the structure of it. No artifacts appeared.

House number four had collapsed to a considerable extent but enough of the roof and other parts of the structure remained so that reconstruction of this type of house, which was unknown to us and to our Indian companions, can be made with some confidence (Fig. 49b and c). The plan was rectangular with the long axis extending northeast and southwest. It was about twelve feet long and eight feet wide. To make the roof, poles extended from the eaves which may have been a log or two lying on the ground, or simply from the ground to a ridge pole which was not positively identified. This ridge was estimated to be four to five feet above the ground. Lying at right angles to the rafters were small poles averaging perhaps two inches in diameter. On the west side the lowest logs were larger, two of them being about ten inches in diameter. Slabs riven from logs were piled on the poles, roofing in parts of the western side.

The front and back of the house was made by piling up small logs to a height estimated to have been about thirty inches. These walls were carefully made, the upper edge being leveled by laying the butt ends of the logs alternately to the right and left. A doorway about three feet wide was located near the center of each of these walls. In this house there was no special support for the ends of the logs at the doorways as was found in a few other houses.

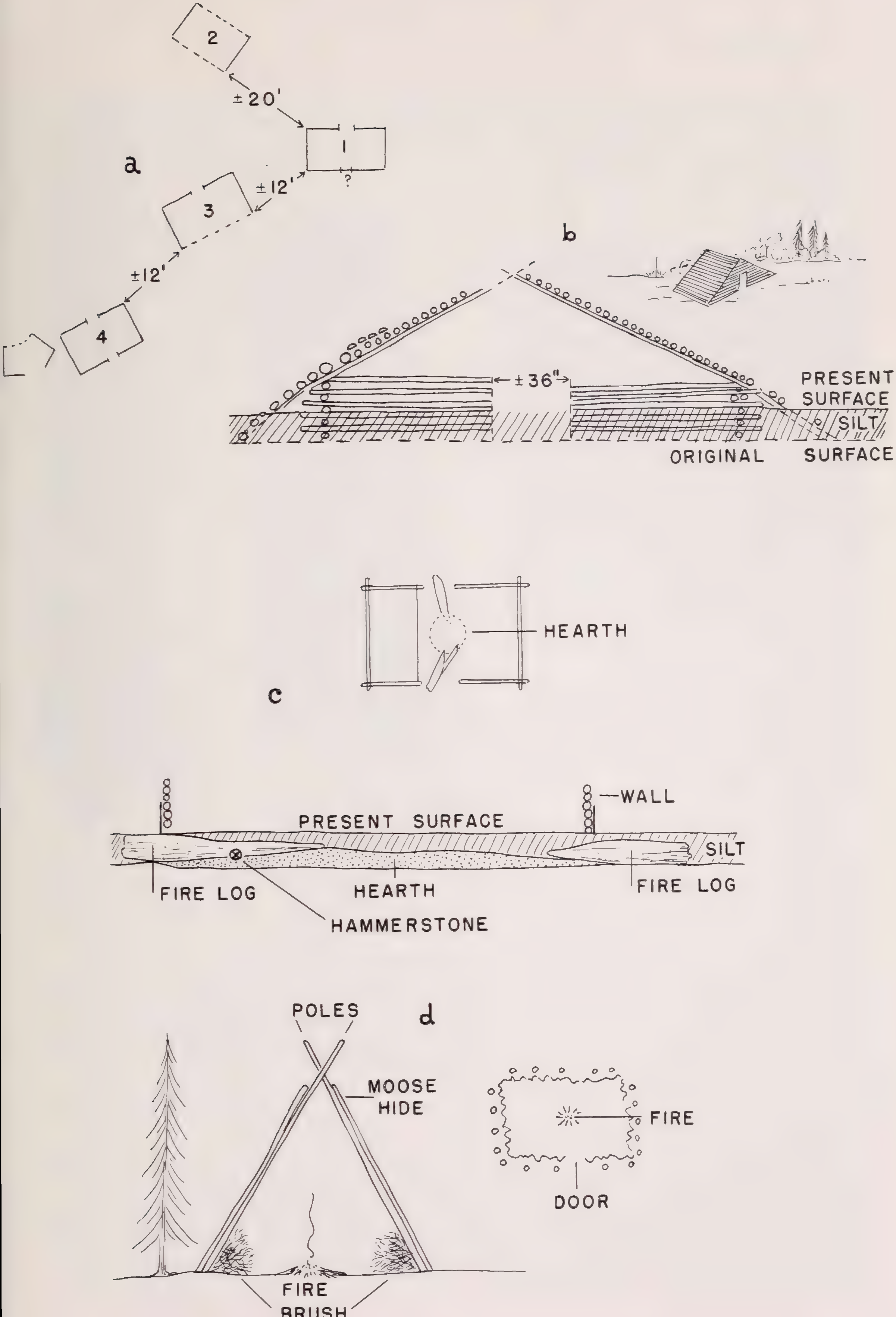
The floor of the house lay beneath about ten inches of silt, the result of at least two serious floods since the houses were abandoned. A hearth zone about five feet across extended from door to door (Fig. 49c). The red-colored ashes of the hearth included pieces of charcoal and many fragments of charred and unburned bone. This was chiefly from rabbit and gopher but there were two pieces of bone from larger animals such as sheep or even moose. This mass of bone, ash and charcoal made a mound above the original floor one to two inches high. A fire-cracked hammerstone was found near one edge of the ash mound. Pieces of birchbark, a fragment of a glass bottle, and a small piece of much-beaten copper were on the floor. Two logs some eight to ten inches in diameter and several feet long lay each with one charred end on the ashes and with their butts out the doors. It is probable that these logs were pushed through the doors so that a fire could be kindled where their ends met in the middle of the house. The floor of the house to the west and east of the hearth had been covered with spruce boughs. The occupants had been careful not to lose a thing in the house.

The remainder of the houses in the area we surveyed were of similar types. That is, many had pyramidal pole roofs analogous to house number one, and others had the pole gable roofs, comparable to house number four. There was some variation in the number of logs used in gable roof construction. The greatest variation seemed to be in the walls. Some were higher than others. Some were made of trimmed logs and some of small trees with the bushy branches left on. Some walls had only one or two logs in them and some were made of eight or ten or more. As in house number one, trees were frequently incorporated in the walls of the structures. In one interesting case a tree had been cut off about four feet above the ground and the stump used as a door post.

We are by no means certain of the covering for the roofs of these houses. Some of the pyramidal roofs appeared to give little or no shelter and it would seem necessary, at least from a European point of view, to cover these with skins. Other roofs had more brush on them and the gabled roofs appeared to give more protection. Thus, a small amount of chinking with moss would keep out the worst of the precipitation.

Estimates of the age of this community came largely from counting tree rings. We recognize the fact that this is not at all precise, especially since no master plot of the rings has been made. A willow (Salix glauca) was growing in the floor of house number four. The ring count indicated that this shrub was sixty-eight years old. One of the rafter poles of house number one had fallen or been placed against the trunk of

Fig. 49. Diagrams and sketches of some old Indian houses. _a_. Diagram to show distribution of the houses investigated in detail on the Duke Meadow. _b_. Sketched diagram of house number four, Duke Meadow. _c_. Plan of house and cross section of fireplace, Duke Meadow. _d_. Sketch to illustrate unusual type of brush camp, Talbot Creek, Kluane Lake.



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POLES
d
MOOSE HIDE
FIRE
DOOR
FIRE
BRUSH

a living spruce tree in such a way that the branches of this tree kept it from falling down, and so that its tip chafed the tree as the latter swayed in the wind. About seventy-two rings had grown on the tree since the chafing began. Comparison of increment borings from logs in the houses with those from living trees produced a barely justifiable opinion that the house logs had been cut for about one hundred years. In view of these observations we can suggest that this community existed about 1850. We have no idea when it was first established or how long it lasted.

The people were very frugal and they left nothing behind. Extensive excavation of the many remaining houses might well bring to light a specimen or two which would permit modification of the estimate of age. The only evidence we have aside from the tree rings is the type of the tools used in cutting the trees. There are numerous stumps of trees which have been cut with an adze (Fig. 50a-c). The technique is described and discussed in another place. Whether or not some of the cuts on the house logs were made with an iron axe or with a copper or stone axe is not easy to decide with confidence. Those of us who have had considerable experience in handling axes felt that many of the logs in the houses had been cut with tools which were sharper than we imagine stone or even copper axes may be.

The houses on the Duke Meadow had the appearance of being roughly contemporaneous. If this is true, a community of considerable size for this part of the country existed seventy to one hundred years ago. No one knows who these people were. Our excavations in four of the houses produced a single Venetian (?) bead and a piece of a glass bottle, aside from fragments of bone and pieces of birch bark. Trade with the outside world is indicated, but whether it was with Europeans or Russians and the extent of it is as yet unknown. Since there was no evidence of the existence of a saw, and only uncertain evidence that iron axes were available, the suggestion is that this trade was in its initial stages.

Moose Johnson led us to a house he had noticed several years before 1948 while chasing a moose. It was located high up on a ridge bordering the headwaters of Henry Creek. The Creek runs into Red Tail Lake about sixteen miles north of the end of Brooks Arm, Kluane Lake. Between the time when Moose first saw the ruin and the time at which we arrived someone had built a brush camp in the midst of it so that the ruin was badly damaged. As near as we could tell, the structure had been one with log walls and a pyramidal pole roof. There is the possibility that it was round, but the existence of one straight wall suggests the former. The poles of the pyramidal (or conical) roof were about four inches in diameter and they had been trimmed of branches. The debris suggested that the pole roof had been chinked with moss.

Removal of the surface debris revealed the floor of the house covered with spruce needles probably from a spruce bough floor lying on natural sand. A burned rabbit's scapula and several scraps of bone were found in the unburned area. In the burned section, comprising some ninetey percent of the area, there were two sheet iron pans (Figs. 47p, q) and fragments of a large chi-tho (Fig. 48c).

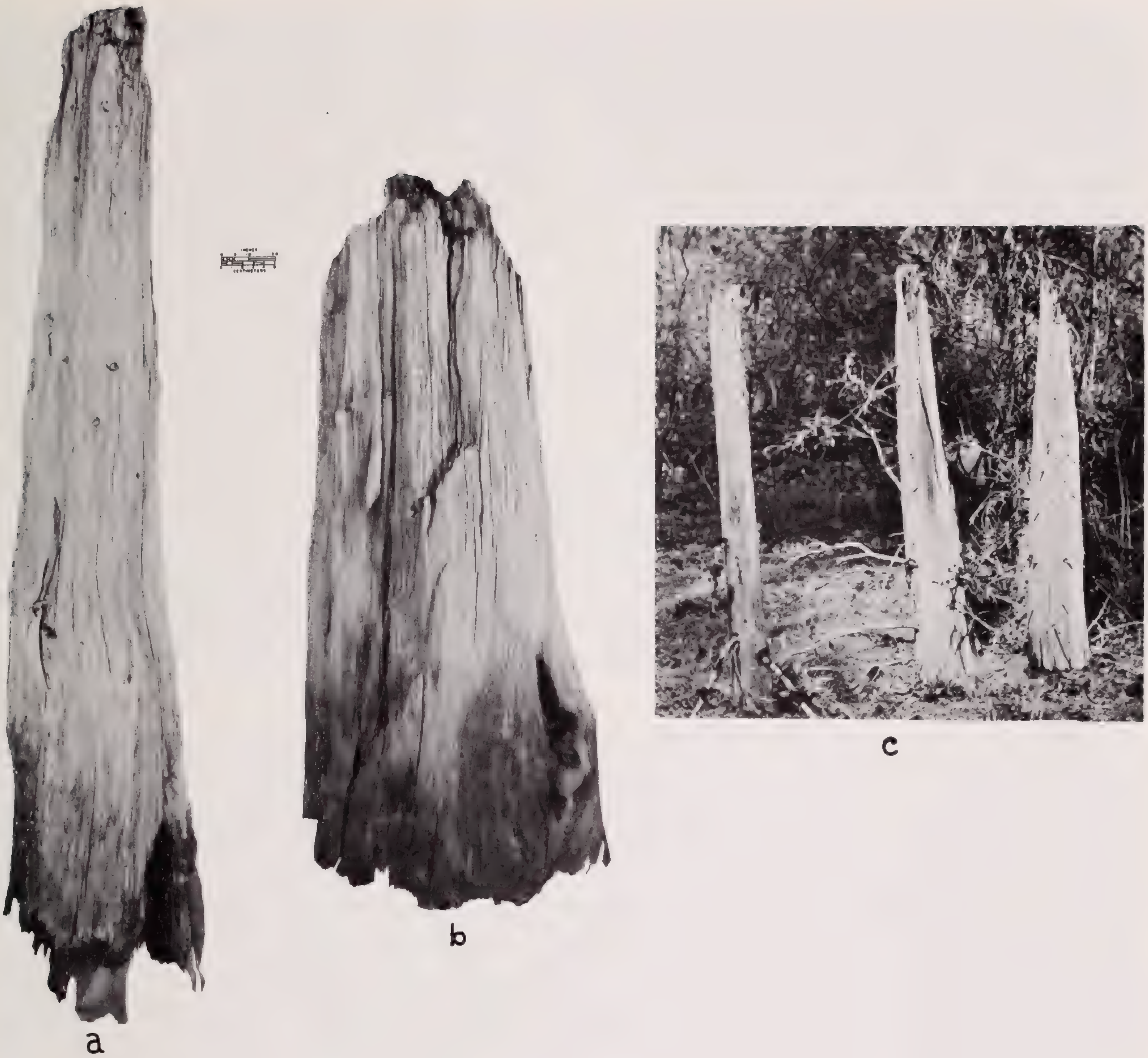


Fig. 50. a-b. Adze cut stumps of white spruce trees collected on the Duke Meadow (July, 1948). c. Adze cut stumps in situ near ruins of ancient houses, Duke Meadow (July 29, 1948).

The iron pans are less than one inch deep and measure about nine by four inches. They were made of a single piece of thin sheet iron, possibly from a heavy grade of stove piping. The corners are folded and neatly hammered so that the pans are watertight. Each pan has a rivet in one corner, the same in each pan. As far as can be seen, the rivet has no function whatsoever. It may indicate that the iron was cut from some other artifact and reused. Our Indians had never seen pans of this sort and they were the subject of much speculation. One idea was that they were traded in from Haines, Alaska, by the "coast people." However, the house is in the general vicinity of the old trail leading from Carmacks to Tin Cup Lake and on to the White River and the pans may have been carried along this. Their function is puzzling. There are no signs of extensive burning or use as a cooking utensil. They may well be eating dishes which took the place of analogous dishes made of birch-bark.

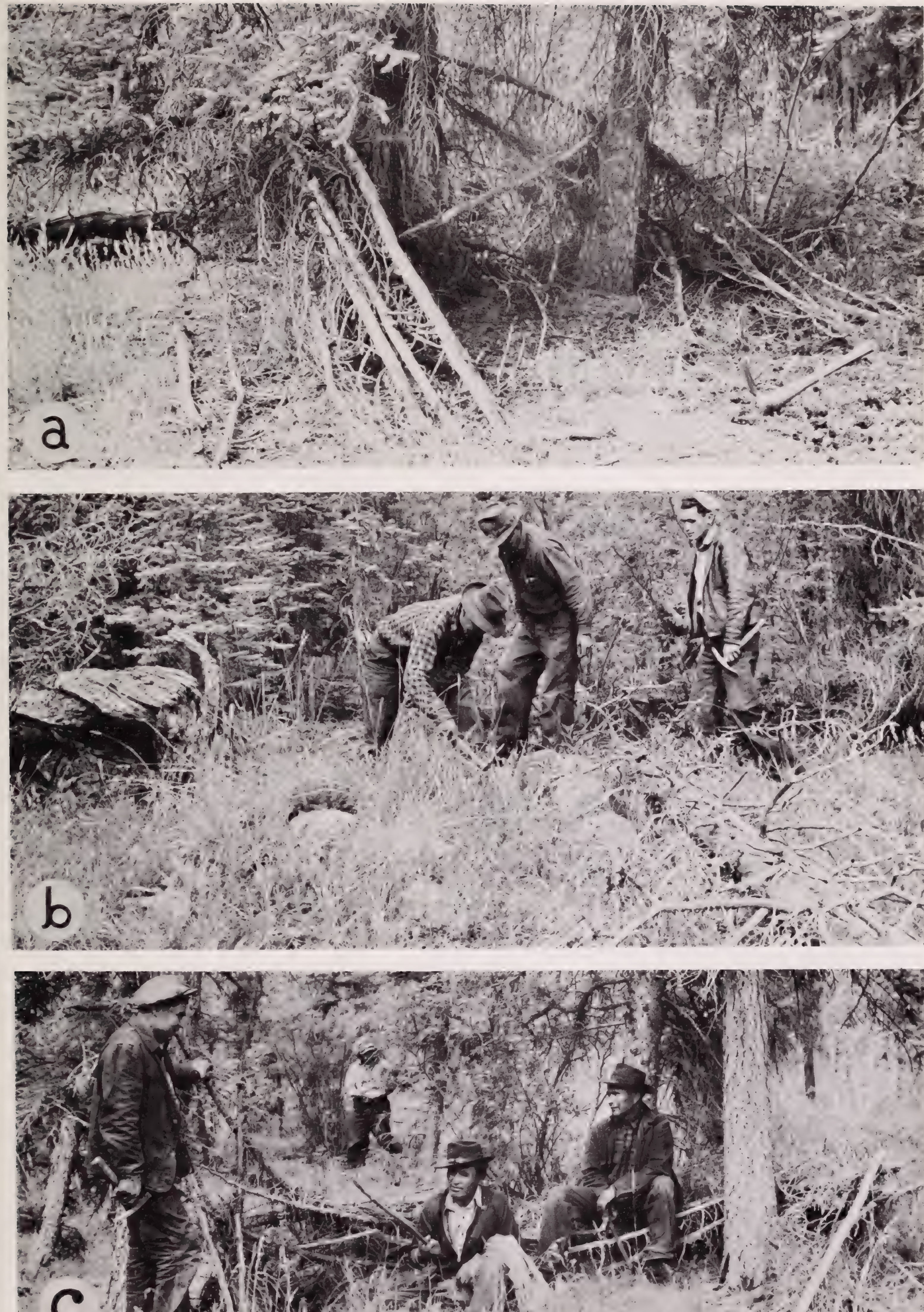
On the bank of Talbot Creek which runs into the Talbot Arm of Kluane Lake, we discovered three house ruins comprised of roughly pyramidal frameworks of poles over rectangular areas surrounded by piles of spruce boughs and brush some four feet high (Fig. 49d). One of these houses measured eight by fourteen feet. The door was a gap in the brush on the long side. When in use these house frames were said to be covered with moose hide. Fires had been built in the middle of the floors where we found ashes and many fragments of moose, caribou and sheep bone. Spruce boughs had been laid on the floor. The structures were of varying ages but none were very recent. A tree, some sixty-five years old, was growing on the floor of one of them. Excavation in one of these houses brought to light a sheet iron pan similar to those found at Henry Creek (Fig. 47m). This dish is made in exactly the same way except that it is smaller, i.e. three by three and three-quarter inches.

Another type of shelter was found in the Alsek Valley just below the crest of the 2,040 foot beach. This can be classified as a hastily or rudely built house or an unusually complete brush camp. It may indeed be of the latter variety having been made in an area too recently uncovered by the receding lake to support trees large enough to supply shelter overhead. Figure 51a shows that a ridge pole was supported about six feet above ground on each end by crossed poles. Small spruces were leaned against this ridge. No evidence of a cooking fire was found. The area inside was large enough for two or three people.

Near mile 1065 on the Highway and between it and Kluane Lake but about one hundred yards back from the shore, we found the ruin of an old lean-to. (Fig. 51b). A ridge pole had been supported about four feet off the ground on one end by a combination of stakes and a small tree, and on the other by a tripod of stakes which had crotches on their upper ends. A few poles reached from the ground to this ridge pole. The sides of the lean-to had been blocked up with the bushy tops of small spruce trees. It is quite possible that the roof had been covered with skins. A fire had been built some distance away from this lean-to. In 1944, this

Fig. 51. Brush camp and lean-to. a. Brush camp found on old beach at altitude of about 2, 040 feet, south of mile 1020 (June 27, 1948). b. Remains of lean-to, partially cleared to show details, near mile 1065 (July 4, 1944).

Fig. 52. Brush camps and cache along Talbot Creek. a. Brush camp on Talbot Creek (July 19, 1948). b. Indians from Burwash Landing excavating a pile of large water-worn boulders which had been carried up some one hundred feet from the bed of Talbot Creek. Nothing was found in what was presumed to be a cache. c. Indians from Burwash Landing sitting in ruins of old brush camp. Moose Johnson is holding a meat roasting stick.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had become an area of deep frost heaving. The bare ground was littered with chips from burned stones and with many splinters of bone. It was impossible to provide an estimate of age for this but the weathering of the poles indicated exposure for a period measured in decades.

The ruins of temporary camps are everywhere. There are localities which have been used as camp sites for an untold number of years. Brush camps, or "open top camps" can be found literally by the hundreds in favorable areas such as along Talbot Creek. The right bank for about a mile from the mouth has been such a camping area and ruins of all ages are found on the valley floor and on the bordering hillside. Another such area, with a similar concentration of brush camp ruins was located in the Ptarmigan Heart Valley. While such concentrations have developed in favorate localities isolated camps are widely distributed. Most frequently these are built wherever a hunter happens to be when it comes time to camp. They are most frequently used in the winter. Water is always near at hand in summer and available as snow in winter, and since hunters usually have some food with them, the principal requirement of a site for a brush camp is merely a supply of small trees and some wood to build a fire. In large measure, this freedom of choice accounts for the random distribution of brush camps. Attempts to classify the sites were foiled because of the wide variation in the character of the locations.

There was too little data to enable us to date the brush camps but there was one very clear horizon. Camps in which "boiling stones" were found, that is, stones which had been heated in order to cook food in the stomachs of moose or perhaps other animals, were older than the trade with Europeans which produced metal pans of various kinds. There was an appreciable number of camps which contained only boiling stones and so one may be sure that life in brush camps extends back into prehistory. This is cause for some archaeological reflection, for such camps leave almost no trace in the ground. We found that even some of the fires are not always preserved. There is the considerable possibility that at least an important part of the significant record of winter life in the north is not recorded in archaeological deposits. This kind of existence is characteristic of the boreal and sub-boreal forest zone. The characteristics may possibly be seen in those ancient most exasperating sites where a few chips, miscellaneous pieces of bone, an artifact or two, usually broken, and a few barren hearths or "burned areas" may be spread over an area of fifty acres or more. We do not know, for example, whether the Bull Brook site in Ipswich, Massachusetts, was forested. If it was, the distribution of the fluted points, scrapers, gravers and other evidence of occupation could, in spite of the distance, have originated in a comparable scattering of brush camps such as was seen in the Ptarmigan Heart Valley or along Talbot Creek. At Bull Brook, chips and tools and rare pieces of charcoal were found in numerous small concentrations occupying a few square yards which were scattered without any apparent plan over half a square mile or more.

One aspect of hunting and traveling in the winter in southwestern Yukon was brought to light when we commenced searching for specimens in a brush camp located about one-half mile from Moose Johnson's log cabin at the head of Talbot Arm. Moose told us somewhat diffidently that he had built this camp. It seems that he was returning home on a very cold winter's day. He built the brush camp and stayed the night in it only a short distance from his destination, "because I was getting cold." Winter temperatures in southwestern Yukon can exceed seventy degrees below zero. The Indians consider it essential to act quickly when one begins to get cold under these circumstances. Moose said that he did not know whether his family was at home and had the cabin warm, and he was taking no chances. A less experienced, impetuous traveler might have been seriously frostbitten if he had attempted that last half mile. It would be interesting to know how many of the isolated brush camps scattered about the country were made, "because I was getting cold." In building a brush camp a tree, or two or more nearby trees, often form the primary support. A number of small trees are felled and the tops piled in an open "V" with one tree at the apex or, as in Fig. 52b, with a tree at the apex and the end of one wall supported by a second tree. This piled-up wall of the tops of spruce trees is usually about head high. The branches from the lower part of the trees are lopped off and laid as a floor between the walls. The poles themselves, which will be six or eight feet or more long, are piled to form a long narrow fire across the open end of the enclosure. Other brush camps were made by piling up walls on three sides of a rectangle. The fire filled the fourth side (Fig. 52c). The variations in shape and size of brush camps are legion but essentially they consist of a brush wall barricade or enclosure facing a long fire.

Brush camps are called "open top camps" in other parts of the north, eastern Quebec for example, because they have no roof. The thick spruce trees give considerable protection. Single hunters or families of any size live in such shelters for weeks at a time, especially in winter. "Double" brush camps are two enclosures facing the same fire. They are not common. For a European, or at least one of us, life in a brush camp is a drafty "hot front and cold back" kind of existence, but a well-arranged brush camp can supply all desired kinds of comfort to a northern hunter.

Investigation of the brush camps brought to light a few interesting specimens. Those along Talbot Creek produced an arrowshaft made of straight grained wood which does not grow in this locality. We also found the ends of two meat-roasting sticks (Fig. 47g; 48e), a piece of birchbark which had been sewn along one edge; a second piece which had been cut to an oval shape (Fig. 47e); a wooden paddle for covering traps with snow (Fig. 47o); a trimmed slab of wood of unknown use (Fig. 48d), a large chi-tho (Fig. 48b), and a bone point (Fig. 47f). The last, probably made of moose bone, is six and one-eighth of an inch wide which has been made by grooving the face and cutting away the bone on either side of the face. The edges have not been sharpened. The butt end of this point has

Fig. 53. Ethnological specimens from Kluane Lake basin and Ptarmigan Heart Valley. a. Cradle board with skin cover, made by Mrs. Jimmy Johnson, Burwash Landing (August, 1948). b. View of gopher snare set in styrofoam "burrow," the two sticks holding the toggle of the snare may be seen; snare collected at Burwash Landing, Kluane Lake. c. Wooden haft for stone (or copper?) adze, Ptarmigan Heart Valley. d. Birch bark foundation for cradle board, Whiskers Creek, north of Kluane Lake. e. Hook used to set gopher snares (46 inches long), Burwash Landing. f. Bow, repaired and strung by Jimmy Joe of Burwash Landing; from cabin at head of Talbot Arm.


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INCHES
CENTIMETERS

been formed by cutting into the sides to form a sub-rectangular section about five-sixteenths of an inch long. From this projects a round spine three-sixteenths of an inch in diameter and seven-eighths of an inch long. One infers that this spine was inserted into a socket in the shaft of the weapon.

Bridge Creek, one of the tributaries of Brooks Creek which runs into the Brooks Arm of Kluane Lake, runs through an area of outwash. Near one of the abandoned channels and not associated with any other evidence of human occupation we found a chi-tho (Fig. 48a) lying on the surface.

In and around the brush camps in the Ptarmigan Heart Valley we found a meat-roasting stick (Fig. 47h) and an implement the Indians said was the haft for a stone (or copper?) adze (Fig. 53c). This haft was made by splitting a section off a trunk of a tree which included a branch. The branch became the handle of the implement and the section of the tree including the knot was the part to which a stone (?) adze blade was attached. The handle is about nineteen inches long. The bark had been removed and the wood had been crudely shaped by riving off long thin splinters. The attachment for the blade is twelve or more inches long. It is rectangular in cross-section and tapers from about one and one-half by one and one-quarter inches to a blunt point. Near the point a hole about one-half inch in diameter was bored. The head of this implement had been shaped around the knot where the handle joined, and a spine, rectangular in cross-section and probably not functional, was carved at the end. The haft is very badly weathered and no doubt it has warped and shrunk in size since it was first made.

Near Whiskers Creek, north of Bridge Creek, the birchbark foundation for a cradle board (Fig. 53d) was found near a brush camp.

A second group of specimens came from the cabin at the head of Talbot Arm. The Indians rummaged around in this dwelling and presented us with the tools they found. This led to additional complications in the accounts of ownership, age, and use of this place. An awl (Fig. 54e) has an iron point set in a wooden handle carved from a crotch of a tree or large bush. The adaptation is cleverly done, for the projections on the end of the tool make it possible to hold it firmly. The second awl (Fig. 54f) has an iron point set in a wooden handle. The shape of the handle is similar to that of the above. The third awl (Fig. 54b) has an iron point set in a handle probably made from a moose antler tine. The end of the short handle is beveled to fit in the hand. Another tool is a section of a saw blade having four teeth (Fig. 54n). This is set in a wooden handle. One outside tooth is larger than the others. This tool was designed to mark concentric circles on bone tools. The circles on the sheep horn spoon (Fig. 47l), and ladle (Fig. 47r) were made with an analogous tool. Two knives are simply crude metal blades set in antler handles (Fig. 54l, m). Figure 54d is the antler head for a blunt arrow designed to stun small game. The small end of the specimen is bored for something the size of a medium-sized nail by which it was attached to the end of the shaft.

A small iron pan (Fig. 47n) surprised our Indian friends. Even though some had lived in this cabin they did not recall having seen it. This pan was four inches by three and one-half inches by less than one inch deep. It had been very crudely made and was perhaps unfinished. The corners were cut and folded, and consequently the pan is not watertight as are the others illustrated. The last specimen from this house is a piece of sheep horn. This has been cut and trimmed to a "blank" out of which it was originally intended to make a horn spoon.

Also in the house there was a bow of the common Athapaskan type. This was not strung and the hand guard was not to be found. It was strung and a new guard fitted by Jimmy Joe at Burwash Landing. The bow (Fig. 43f) is sixty-seven inches long and is made of birch. The front and back of the bow are flat and the edges are rounded. The central portion is about one and one-quarter inches by three-quarters of an inch. This tapers to the ends which measure about one-half by one-quarter inches. The bow is bent away from the archer at the central location of the hand guard. The lower quarter of the bow is recurved noticeably; the upper quarter is recurved to a lesser degree. Notches at the tips have been cut into the wood. The hand guard is a piece of soft wood lashed with boot lacings (cow hide?) at right angles to the bow which it fits closely. The sides of the guard flare slightly and the end struck by the string is incurved. The bow string is made of a single strand of raw caribou hide. This has been twisted. The string is attached to one end by means of a loop tied with a variety of the lumberman's hitch. At the other end the string has been wrapped clockwise around the notch. The end is then tucked under the standing part and carried around the end counterclockwise so pulling the string into the center of the bow. It is then tied on itself with a variety of the rolling hitch. The last bight of the knot is not worked up.

Albert Isaacs, one of the Indians from Aishihik presented us with six bone points (Fig. 54a, g-k). Two of these were found in an archaeological site located near the village (a and g), q is six and one-half inches long. The shaft is oval in cross-section and has three barbs. The haft is flat on the front and back. The left side, as illustrated, has been roughly cut flat but the right side is rounded. Very shallow notches have been made by chopping with a sharp tool. A line hole has been bored through the haft of the point. This hole is straight, probably having been bored from one face. "a" is a fragment of a point. It is curved, possibly made from the ulna of a caribou or even sheep. Square notches, three-sixteenths of an inch wide, have been cut at five-sixteenth inch intervals along the sharpened edge. Between these, two small "V" shaped notches have been cut. On both faces an incised line leads from each of these toward the center of the tool. The haft is a pointed spine, oval in cross-section and about an inch and a quarter long. Four bone points had been made for us by Isaacs, h-k. These were made possibly from moose cannon bones and are quite similar except in detail. The obverse face shows the outer surface of the bone except along the upper third and the barbed

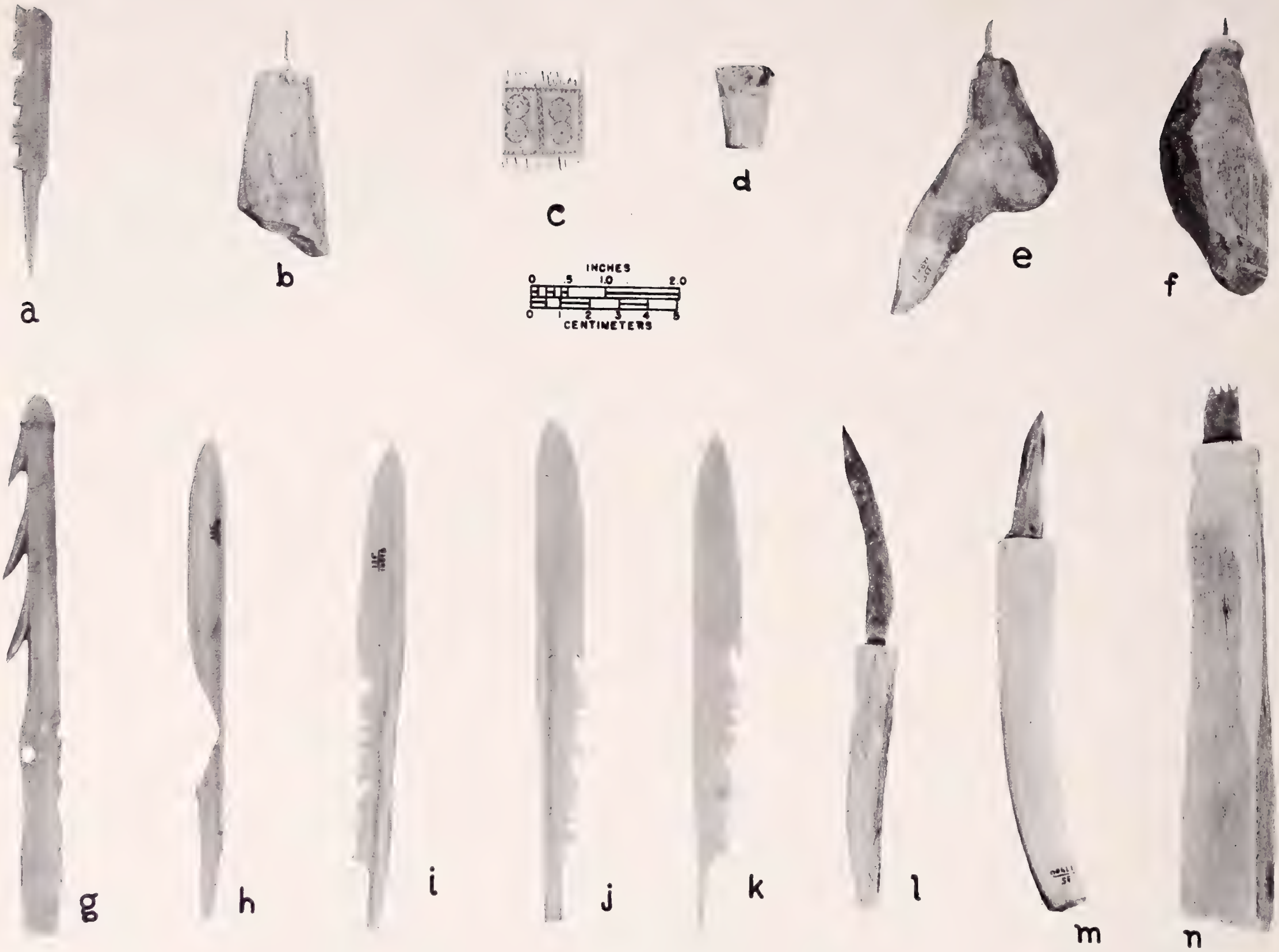
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Fig. 54. Ethnological specimens from Kluane Lake basin, Lake Creek cabin, and Aishihik. a. Fragment of barbed bone point, from an archaeological site at the north end of Aishihik Lake. b. Awl made by setting an iron point in an antler haft, from cabin at head of Talbot Arm. c. Bone comb having incised decorations, Lake Creek cabin. d. Antler head from a blunt "stunning" arrow, cabin at head of Talbot Arm. e-f. Awls, cabin at head of Talbot Arm. g. Barbed bone point (harpoon?), from an archaeological site at the north end of Aishihik Lake. h-k. Barbed bone points made by Albert Isaacs, Aishihik, north end of Aishihik Lake (August, 1948). l-m. Iron knives with antler handles. n. Tool made of saw to incise circles on bone tools, cabin at head of Talbot Creek.

edge. These surfaces have been filed either to thin the point or to sharpen the barbed side. The barbs have been made in the sharpened sides by cutting notches with a saw. The reverse side shows either the natural groove in the bone or a groove formed by the interior of the bone.

Two beaming tools were presented to us by the Indians at Burwash Landing (Fig. 48i, p). They are similar to the one found at the Lake Creek cabin (Fig. 48j). These are made of the right and left metapodials probably of caribou. The bone has been split or cut open longitudinally and one edge has been sharpened by trimming the inside and by beveling the outside. A section (Fig. 48p) has been broken off probably when it was made.

One sheep horn spoon (Fig. 47e) was made at Burwash Landing. It is about ten inches long over all; the bowl is about three and one-half inches long. The handle is flat from side to side and slightly curved. It is at an angle of about thirty degrees with the top of the bowl. The spoon is decorated with circles incised into the handle and upper part of the bowl. The centers of two of these circles are holes bored through the handles. Five holes have been bored through the handle along its upper "V" shaped edge and a three-eighths inch hole near the end could be used to hang up the spoon. Albert Isaacs from Aishihik made a large sheep horn spoon or ladle to present to us (Fig. 47r). The bowl of this is about five and a half inches wide and six and one-quarter inches long and is nearly two inches deep. The tapered handle is practically rectangular in cross-section and about eleven inches long. It stands at an angle of nearly forty-five degrees to the bowl. Five units of double concentric circles have been incised into the lower part of the handle. The incisions have been filled with red paint.

The birchbark foundation for a cradle board found near Whiskers Creek has been mentioned (Fig. 53d). This has suffered from exposure to the elements. A complete cradle board with a caribou skin cover and a frame for protecting the baby's face was made by Mrs. Jimmy Johnson who presented it to us (Fig. 53a). The foundation was made by cutting and bending a piece of birchbark to form the dish-like lower end. All sewing was done with spruce root. The grain of the bark runs longitudinally. To prevent this from splitting, a piece of birchbark with the grain running transversely was attached across the upper part of the foundation, both on the inside and the outside. A rod foundation was lashed with spruce root around the edge of the foundation.

The leather covering was made of white tanned caribou skin. The leather was cut to fit the bark foundation. It was sewn with cotton thread on a machine except where strength was necessary. In such places sinew was used. In the back, a dart-like cutting and sewing helped to fit the leather around the foot of the foundation. At the top, the leather was folded into a pocket which covers the upper end of the foundation. A decorative patch with notched edges completes this pocket. The front opening is bordered on each side by doublings of leather. The edges are finished with decorative notchings. Fringe of smoked moose hide borders

the front. Floral designs are worked in green, red, and blue beads strung on cotton. The front is closed by three leather ties. A wide tumpline is attached to the back. One end of this is permanently sewn on with sinew. The other end ties into a loop which is sewn to the back with sinew.

A frame to be attached to the cradle board after the baby has been wrapped and tucked into it is made of a hoop, probably of willow, to which two other hoops have been attached at right angles by lashing with spruce root. When placed over the baby's face, blankets can be thrown over it to protect the infant from the cold, mosquitoes, and bright sunlight.

Five birchbark baskets were made at Burwash Landing (Fig. 48, k-o). These are round or roughly oval, varying from seven and one-half inches to about four inches in diameter and from four inches to two and three-quarters of an inch deep. The baskets are not watertight, for the bark is cut and folded at opposite sides. The seams are sewn with spruce root. Wooden rods have been bent around the edges of the baskets and lashed with spruce root. Four of the baskets have a scalloped skirt of birchbark around the edge beneath the rod. On three of these baskets additional decoration is provided by making long stiches with the spruce root lashing at intervals around the edge. The fourth basket has the scalloped skirt but none of the decorative stitches. Spots of red paint or dye have been applied to two baskets. The fifth basket does not have the scalloped skirt. However, the decorative stitches of the lashing are present and a piece of sinew has been woven into the lashing on the top of the rod.

In areas where the forests are old many conical stumps are found. They are especially common in the vicinity of houses and brush camps. These are the result of felling trees with an adze hafted on an elbow-shaped handle such as the specimen found in the Ptarmigan Heart Valley (Fig. 53c). The Indians' descriptions indicate that technically the tool was an adze. It may have been of stone or copper. Axes were said not to have been used by the old people known to the Indians at Burwash. The method of felling trees can be reconstructed from the stumps themselves (Fig. 50a, b, c) and the chips lying at their bases. A cut was made with the adze three feet or more above the base of a tree and a chip two to four inches wide and from eighteen to thirty or more inches long split off. This chip ran longitudinally down the tree. The lower end may have peeled off the tree or it may have been broken off. Rarely it was cut off by a blow with the adze. Such chips of varying sizes were removed all around the circumference reducing the size of it to a point where the tree broke off. This breaking was sometimes assisted by a few blows of the adze. We note that the Indians selected trees with relatively straight grain. We do not recall stumps of trees having the spiral and twisted grain so common in these forests. The stumps observed varied from about six to twelve inches in diameter. The long narrow chips were commonly found around the bases of the stumps, deeply buried in the

moss. All stumps seen had been cut for an appreciable length of time, judging from the degree of weathering and the lichens growing on them. Our evidence indicates that the oldest stumps were smaller than the more recent ones.

Hunting was done by the conventional methods of stalking and shooting. The present Indians can remember using bows and arrows especially for small game. They told us that their fathers had a few guns but they did not trust them and so always carried bows and arrows. At Burwash Landing an account of a fence to which moose were driven by groups of hunters is frequently repeated. We did not see the remains of this fence. An account which certainly needs confirmation tells of driving mountain sheep out onto a promontory from which they could not escape. Regardless of these activities, trapping or snaring animals provides a very large part of the food supply and practically all the furs which were a major source of income until the bottom dropped out of the market.

Gopher snares are special adaptations to the habits of the gopher, which digs its burrow at an angle to the surface of the ground. The snares are made of eagle feather quills, a strip of tanned moose hide and a stick which becomes a toggle three-quarters of an inch long by one-quarter of an inch in diameter. Women, who are usually the ones who set these snares, will have a dozen or two of them stored in a bag with some sage (Artemisia frigida). The latter is to counteract the human scent.

A loop is worked into one end of the split eagle quill by softening it in warm water. The other end has a stop knot worked into it and it is then passed through the loop to form the noose of the snare. A small piece of split quill, tapered at both ends, is tied to the quill close to the stop knot to become a trigger. The tying is done with the moose hide and is included in the clove hitch with the toggle.

Figure 53b is a view of the snare set in a "burrow" made of styrofoam. To set the snare two short sticks are collected. A wooden hook (Fig. 53e) is then pushed through the earth over a gopher burrow a few inches from the opening. The moose hide string is placed in the hook and it is drawn back to the surface. A nearby sapling is bent over and held while the moose hide string is tied to the end. The two sticks are placed inside the burrow, one on each side of the string. As the tension is released the toggle lashed to the noose is guided to these sticks. Also the loop is caught with the trigger. The noose is then held in position by the tension of the sapling.

The gopher puts his head in the noose, which upsets the two sticks and trips the trigger. The noose is tightened by the tension of the sapling and the animal is held firmly against the roof of the burrow.

A rabbit snare consists of a length of sinew one end of which is worked into a noose. The standing end of the noose is attached to a trigger stick about two inches long and one-half inch in diameter. This stick has a shallow notch in one end. A second length of sinew is attached to the other end of the trigger stick near the notch. At the other end of this length of sinew the loop of a slip knot is made.

The trigger stick is placed over a small pole laid across a trail. The noose is arranged to hang at right angles to the trail under the pole and is held lightly in position by twigs. The line from the other end of the trigger stick is brought under the pole and back to the notch on the end of the trigger. After being caught in the notch the noose of the slip knot at the end of the line is hung over a sapling which has been bent down. The whole apparatus is held in place by the tension of the sapling. When a rabbit jumps into the noose the line falls out of the notch of the trigger stick and the tension of the sapling pulls the noose tight and chokes him.

A deadfall designed for lynx or fox was found along a trail. Two parallel lines of closely set stakes formed the sides of a "box" which was roofed over. The end of the box to be used for trapping was closed by a large tree. A gap in the sides near the tree formed a slot in which was laid a log to act as a sill. A head log lay also in this gap. The ends of the head log projected outside the walls far enough to support the ends of several long logs running parallel to the walls. When in operation the head log was held up by an upright stick and a horizontal sharpened and barbed bait stick. These were not fastened, being held in place by the weight of the head log. The animal entered the deadfall, going toward the tree. Disturbing the bait stick brought the head log down, pinning him to the sill.

The remains of the "pocket" of a fishweir were found on the bank of Brooks Creek near the confluence of Bridge Creek. This pocket was set at the apex of two fences extending across the brook to each bank. The open end faced upstream and the sill was near the surface of the water. The other end was as deep in the water as the sides permitted. A much larger weir of the same type has been shown in operation on the Upper Yukon River (Jenness, 1932, p. 397). Our information is equivocal but we were told that an occasional salmon was caught at the Brooks Creek site, though other species were apparently more plentiful. The series of riffles along the Creek in this locality were a well known and ancient fishing ground which could be used by anyone. A search failed to reveal an archaeological site.

Salmon apparently do reach Tin Cup Lake. Albert Isaacs from Aishihik described a conical fish trap made of small poles laced with spruce root. The opening is a hoop about two feet in diameter to which the ends of the poles are lashed. The trap is six to eight feet long. Salmon swim in and become wedged in the cone.

Sweat houses are used occasionally at the present time (1948). A hole is dug in the ground and a canvas tent built over it. The original sweat houses were dome shaped, made of bent poles and covered with moose hide. Several people put hot rocks in the hole and, after swimming in a creek, they go into the tent closing it tightly behind them. They throw water on the rocks to make the steam which heats the tent. Our informants assured us that no one dove into the creek afterwards.

Our Indian friends at Burwash Landing had been extensive travelers and they knew intimately the country between the upper reaches of the

White River and Carmacks, a distance of about one hundred and fifty miles east and west. They had roamed and hunted with their families at different times over the country from the White River south for some sixty or eighty miles, or all told an area of some ten to twelve thousand square miles. Questioning concerning land ownership was not extensive or consistent. The testimony we have is to the effect that there are no claims to the land; anyone can travel and hunt where he pleases. There is some evidence that families habitually hunted in certain general areas, but the camps might be moved, and even the cabins built since 1900 could be used by anyone if they were empty. Whether or not the fur industry had resulted in some rules we do not know, but in 1948 the fur trade was at a minimum and appeared to have little effect on the economy, at least at Burwash.

In moving about the country the people followed trails which were well known and which apparently had been used for long periods of time, perhaps even measurable in centuries. One interesting trail led from the vicinity of Carmacks on the Yukon over the divide into the Nisling drainage where it passed through the Ptarmigan Heart Valley. It went over a pass into Henry Creek and from there to Red Tail Lake and to Tin Cup Lake. Crossing the Kluane and Donjek Rivers it led into the mountains to the upper reaches of the White River. As mentioned in another connection, there are branches of this trail leading to Kluane Lake, Aishihik, and so on. In traveling over portions of this trail we saw that it had been used enough to wear a deep path.

In order to cross the deep rivers the Indians made rafts. They also frequently made bull boats. Two moose hides sewn together were stretched over a crude frame. This was round bottomed and roughly pointed at both ends. The frame was discarded after each use. We found a dugout canoe at Dalton Post but we assume this had come from the Pacific coast.

According to the accounts we heard, the "Carmacks trail" was an important trade route between the Yukon and the White River. The copper nuggets found in the gravels of the latter place were in great demand everywhere. Among other things they were exchanged for arrow shafts originating in the Yukon Valley. It seems that the grain of wood in trees growing in much of the interior is usually spiral or otherwise irregular. Trees with straight grain suitable for arrows were found to grow best in the Yukon Valley, and such wood for arrowshafts was a scarce commodity elsewhere. One such arrow shaft was found in a brush camp on Talbot Creek.

Trails which connected the Athapaskan territory with the coast ended apparently in battlefields. The Athapaskans and the Tlingit did not get along, and until the fur trade was firmly established the known trails through the mountain passes were unhealthy routes to travel. There is a persistent rumor that a battle along one of these trails took place so recently that the bones of the dead and their weapons still lie around on the ground. This we did not verify.

When an Indian tells an archaeologist, "he no relation to me he marry my sister," the archaeologist experiences a certain frustration and attempts to change the subject. Such reprehensible behavior is partly responsible for a great dearth of information concerning the social organization and related aspects of the Indian culture at Burwash Landing. The men and women we worked with belonged either to the Wolf or the Raven clans. The clan organization, which was exogamous, was apparently breaking down. Sam Johnson, for one, who belonged to the Raven clan married a woman of this same clan probably between 1915 and 1925. We were told that this created a lot of bad feeling at Burwash. "In the old days," we were told, children of such a union would have had their eyes gouged out by women who used their third and fourth fingers for the purpose. It was further said that this custom of making violent objection to incestuous marriages within the clan had been very difficult to stop.

Accounts of burial customs which we have heard obviously refer to different periods and we are not sure whether the testimony is purely Athapaskan or mixed with Tlingit. Moose Johnson's grandfather is said to have remembered the cremation of the dead. There seemed to be general agreement among all the Burwash Landing Indians that this was the ancient custom. Also cremation may have been the means of disposing of people killed in war but whether this was special treatment or not was not made clear. We were told that the bones of cremated individuals were put in log caches raised off the ground. At the present time the dead are buried and a small gabled-roof house is built over the grave. Tools, clothing and other useful articles are left in the houses for use by the spirits of the dead. The following myth was cited to explain the change from cremation to burial and the use of the little houses. One time a man died and was cremated. After four years he came back to life. He lived four years after that. He told the people that the Indians were in poor shape. Some were half burned, some were without clothes, some only had a head. The white men were poor, some of them only had a sheet. After that the people began to bury their dead and leave things with them. They built little houses over the graves for them to live in. Now the Indians who die are in good shape in the after world.

The remnants of the feud between the people of the coast and those in the interior may obscure some important details from which one may make acceptable inferences concerning the type of subsistence or, perhaps better, the character of the economy of the people. We were especially interested in projecting this back into prehistory. The Indians we knew at Burwash Landing claimed that they did no fishing except for netting whitefish after the lake froze to use for dog food during the winter. This is without question a very recent development. The basis for their subsistence, so they said, was the product of their hunting and trapping. They spoke of the "fish eaters" with great scorn and would have little or nothing to do with them. They said that to live by fishing was a poor way to exist. This assertion as a whole makes a certain amount of sense for the area which the Indians at Burwash frequent produces relatively very

little fish. Our observations bear this out to a certain extent. The Indian community never went fishing and we heard nothing of nets or other paraphenalia. Note also that these people do not have boats which are good for anything, except crossing streams. The exception is the trap on Bridge Creek, distant about two days' journey. It is significant to note that we could find no ancient site there and that the chi-tho we did find nearby could easily have been modern. One like it was made in our camp to help tan a sheep skin. Northern hunters do not eat a great deal during the summer, at least they do go for long periods with very little to eat. However, when the people at Burwash Landing finally got hungry, two Indian women went moose hunting. It is amusing to note that they took a bus along the Highway which saved them a walk of several miles. Also, when they had killed a moose they flagged down another bus and brought the meat home in it! The point is that they went after moose not fish.

This very definite and often expressed opinion that hunting was the only way of life practiced by the Indians at Burwash Landing, if it is correct, has come important consequences. Inferences concerning subsistence based on archaeological discoveries can only be valid if considered in the light of available resources. A few fish bones at a site do not mean necessarily a fishing economy nor does it mean that people traveled to lakes in the summer for the fishing. Such an inference can only be made if it is known that the site is located on a lake where there was an adequate supply of fish. There is a great question, for example, whether or not enough fish could be caught with aboriginal equipment to support the population in the Kluane Lake region. There are times when even with modern equipment that "market fishermen" cannot supply the needs of Burwash Landing. These observations and the testimony of the Indians is reason for questioning some of the inferences made by MacNeish. We suspect that there is a geographic aspect based in some measure on the natural resources of a region which is beyond the limited scope of purely archaeological data.

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INVESTIGATIONS IN SOUTHWEST YUKON

ARCHAEOLOGICAL EXCAVATIONS COMPARISONS, AND SPECULATIONS

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THE ARCHAEOLOGICAL RECONNAISSANCE AND EXCAVATION

INTRODUCTION

There were a number of reasons for undertaking archaeological investigations in the southwest Yukon. Previous surveys in the area by Rainey (1940), Johnson in 1944 and 1948 (1946, 1952), and Leechman in 1949 and 1951 yielded artifacts which had resemblances to ones from other areas; some were similar to tools I had uncovered in a program of research in the northern Yukon and the Northwest Territories. Thus, researches in the southwest Yukon were an extension of undertakings initiated in these adjacent areas. It was hoped that artifacts similar to those previously found could be recovered in larger numbers and in series of assemblages that could be arranged in a sequence. It also had been noted that some of the artifacts that Johnson and Leechman had collected were not only similar to those in Alaska but also resembled specimens from northeast Asia. In light of these various resemblances, there was the expectation that a complete sequence of cultural complexes from the Yukon could be related to others in northwest America, and that this information could be brought to bear upon the problem of migrations into the New World. Even more ideally, such basic information, perhaps would permit establishment of a hypothesis concerning the cultural process involved in the peopling of the New World, and perhaps further testing of the hypothesis might result in a theory concerning the cultural process involved in the social phenomena of migration.

Any statement of specific problems by an archaeologist is, of course, governed by his purposes (other than personal satisfaction) for undertaking archaeological research per se. Although in a previous publication (MacNeish 1958) I have stated my general aims, I believe they are worth repeating at this time because there will be those who are not familiar with the latter publication. More especially these purposes definitely predetermine the methods and techniques herein employed.

To me, the ultimate goals of archaeological investigations are generalizations about cultural change or cultural process. From this standpoint my ultimate purposes closely parallel those of the natural sciences and are certainly similar to, if not the same as, those of the so-called social sciences. Methodologically, some of these generalizations are dependent upon the comparison of a series of relatively complete archaeological sequences or historical reconstructions. Therefore, the secondary purpose of archaeology is the construction, or the attempt at reconstruction of the culture of peoples in the past, and the arrangement of such reconstructions in sequences from which historical development may be inferred. Any such cultural reconstruction not only is necessary for comparative studies but may be of use in exploring ethnographic phenomena. That is, it is useful in checking ethnological conclusions about the histories of living peoples. Of course, as an accumulation of knowledge it is worthwhile for its own sake.

On a theoretical level there are two general approaches to this secondary purpose of archaeology (Willey 1953). In order to reconstruct the way of life of the past the conjunctive or integrative approach is employed (Taylor 1948). In the chronological approach one attempts "to arrange the artifacts, human remains or cultural complexes so as to show cultural development or changes through time and relationships in space" (MacNeish 1958). Often these two approaches go hand in hand in the analysis of archaeological materials.

Obviously, data for either of these approaches, for the most part originates with excavated materials and contextual information. Therefore the final aim is to obtain the archaeological record from excavation and reconnaissance. Since most archaeologists must work with limited funds, and in the northern regions with limited time, survey must be skillfully and energetically undertaken so that the best possible sites be found for excavation. The best possible sites are those which produce a maximum of information with the least expenditure of money, time, and energy. The reconnaissance should reveal sites with a wide range of artifacts or artifact complexes and sites which have these artifact complexes sequentially or stratigraphically arranged. Also sites must provide an abundance of artifacts for each of the tentative complexes found in the analysis of survey materials. It has been my practice first to excavate as many of the stratified sites as possible in order to obtain an outline of the cultural sequence. Later the larger and richer single period sites are excavated so that it is possible to reconstruct more fully the way of life of ancient peoples during each chronological period.

It is appropriate to mention something of what was accomplished in the Yukon by the National Museum of Canada. Our field program began in June of 1957. My two field assistants Reginald Hamel and Mark Molot, my dog Cli-ja and I traveled by car from Ottawa to the Yukon via the Alcan Highway. While it is true that we did look for sites along the highway, our program began with the checking and visiting of the 20 or more sites that Johnson (1946) and Leechman had found in their surveys. This checking of sites took about a month, and then later we made a boat trip down the Yukon from Johnson's Crossing to Dawson City. From this initial resurvey of Johnson's sites as well as from our river excursion, we gradually obtained a general knowledge of the pattern of site locations. We soon came to realize that it was necessary to strip soil or to dig small tests in order to get an adequate sample of artifacts from any single site and to determine exactly which zones or strata contained the artifacts. The crucial chronological significance of the soil zones had been determined by F. Johnson and H. M. Raup in 1944 and 1948 and we continued to exploit their original observations.

Our work during much of June and the first half of July 1957 moved very slowly. We only found about 35 sites and over half of them had previously been discovered by Leechman or Johnson. Then, the reconnaissance shifted into high gear. In the next 60 days we found 61 sites. This was remarkable in that much survey time was lost repairing our decrepit

equipment and rolling stock, buying supplies in Whitehorse, and filling out those bureaucratic forms apparently so necessary in keeping a government sponsored expedition operating. The results of this, our first reconnaissance, included the finding of one or more artifacts in 96 sites, the testing of about a dozen sites, and the intensive excavation of the Callison site. Except for the latter, all investigations were made in an area bounded by Johnson's Crossing, Burwash Landing, Dawson City, and Mayo (Fig. 1). The sites discovered were recorded in a system designed to locate all sites in Canada in a uniform manner (Borden 1952a: 44-48). The designation locates areas which, south of 62° North, are approximately 11.5 miles north and south and 7 miles east and west. North of 62° there is a slight modification because of the rapid convergence of the meridians. The first capital letter refers to latitude measured in units of two degrees. Each unit is subdivided into 10' of latitude which is designated by the first small letter. The second capital letter refers to a meridian of longitude, the unit being four degrees east and west. This is divided into 10' of longitude, each unit being designated by the second small letter. The numbers refer to sites within the designated squares of the grid.

In this report the area is covered by a grid marked by parallels lettered "J," "K," and "L" and meridians lettered "V," "U," and "T." These have been marked on the maps (Figs. 76-79). The small letters are included in the margins. It should be easy to locate the sites designated by the many symbols. The use of such symbols is a matter of great convenience. Excavated sites have also been named and there are not too many to keep track of. Symbols for the excavated sites are included for purposes of record and occasionally to save space. On the other hand there are many localities where artifacts have been found either on the surface or in a manner which has limited significance. To invent names for all of these would result in extreme confusion.

In the following winter and spring, I analyzed these archaeological survey materials, set up some tentative artifact types, constructed some tentative artifact complexes, and established a tentative sequence based upon seriation and the correlation of artifact assemblages with the zones in a soil profile (MacNeish 1960b). However, even more important than these tentative conclusions was the determination that certain sites upon excavation might yield a cultural sequence based upon good solid stratigraphy.

The next three seasons (1958-1960) were spent digging the best of these stratified sites. As well, we supplemented our information about the various complexes by digging single period sites. During the first half of 1959, we excavated the Little Arm site (JiVs-1) on the west end of Kluane Lake near Burwash. This was a stratified site with four cultural components one above the other. During the second half of the season, we dug near Canyon Creek on a site (JfVg-1) which had eleven superimposed occupational layers, and at Taye Lake (JfVb-4) where the remains of one culture overlay another. In 1960 we returned to Kluane

Lake and while waiting to set up our camp near the Big Arm (since renamed Talbot Arm) we excavated further at the Little Arm site (JiVs-1). Most of that season, however, was concerned with digging the Gladstone Creek site (JhVq-1), which had three stratified cultural components. Late in that sojourn we tested two single period components, one along the Aishihik road (JhVf-4) and another in Moosehide (LaVk-2) near Dawson City. We also spent four days at the Pelly Farm stratified site (KfVd-2). This latter site was dug mainly during the 1961 season and was found to have five levels of occupation, one above the other. Also, in this season, we revisited the Little Arm, Canyon Creek, and Aishihik road sites. The archaeological techniques used in these excavations will be explained in the description of the sites.

Analysis paralleled our excavation program. The analysis and description of artifacts is fully covered in the appendix, but I shall mention some general aspects here. Basic to the analysis is the concept of an artifact type. A type is defined as a group of man-made objects exhibiting interrelated similar features (or modes) having temporal or spatial significance. Definitions of the numerous artifacts features, or modes, are approximately the same as those described and illustrated in the report on the archaeology of Manitoba (MacNeish 1958b: 85-178). The procedure for establishing types is roughly the same as I have used to establish artifacts types in other areas.

Assuming that types were invented, that they prospered and then eventually became extinct, it is possible to observe trends of types manifested in our five stratified sites. On the basis of type trends in sequential layers as well as from the relative proportions of types at single period sites, it is possible to arrange them in chronological order. This process is a combination of typology and seriation interconnected with and dependent upon stratigraphy. Such manipulations not only reveal the trends of types but also the sequence of layers in excavated sites, or in single period sites found in survey.

Some of the layers of excavated sites and the single period sites are considered to be components. A component may be defined as a single occupation by a single cultural group. Since component quality or reliability vary considerably, components are divided into three categories: pure, probable, and possible components. By the term pure component is meant that enough artifacts were found so that they unquestionably belong to one cultural group, and that the layer in which these artifacts were found was well enough defined so that it must be considered as having been occupied at what, for heuristic purposes, is considered only one moment in time. Probable components are those layers or sites having artifacts which because of either more limited number of artifacts or more poorly defined occupational layers cannot certainly be said to represent a single occupation by a single group of people at a given time. Sites or levels called possible components have even poorer congeries of artifacts or poorer contextual occupational data so that one is very unsure as to whether they are a single occupation by a single people. Some sites,

of course, are of even poorer quality and these are referred to simply as site collections (MacNeish 1960).

However, when the sites are compared and the artifacts placed in sequential order, certain clusterings of types appear in a number of different components. These recurrent clusters are classified into units called either phases or complexes. A phase is defined as a distinctive cluster of artifacts and traits which occurs at one or more pure components as well as at probable and possible components. It is assumed that a phase represents the preserved material remains of a single group of people whose distinctive cultural assemblage existed during a single time period or during a time period within which neither very many nor very significant cultural changes can be discerned. A clustering of types and traits which appeared only in one or more possible or probable components is called a complex. In reality, complexes are here considered to be tentative phases (MacNeish 1958).

The above assumptions, premises, methods, and techniques are the basic tools used in our archaeological analysis of the southwest Yukon. A number of techniques from fields outside of archaeology could be brought to bear upon the understanding and better interpretation of this preliminary archaeological analysis. Biologists identified bones of the animals killed by the ancient peoples, pollen from the deposits, and evidence of developing vegetation giving us information about subsistence, butchering techniques, prehistoric climate, and environment. Atomic physicists, with radiocarbon determinations, and geologists gave us hints as to the age of our excavated materials. Some of our interpretations of the archaeological data were taken from ethnographic sources. All in all, a number of kinds of information from various sources were brought to bear upon our interpretations of the archaeological materials. Unfortunately circumstances prevented the application of many other sources of information.

The foregoing is concerned with problems within the southwest Yukon, but some of our major problems involved wider relationships. In the final part of this volume, after comparing the complexes and phases of the Yukon with each other, we have undertaken comparisons with other manifestations in northwest America. As an integrative device to classify a number of units that have similar artifact complexes, it has been found convenient to employ the concept of tradition. By tradition is meant a distinctive way of life persisting in time and space as it is distinguished by a complex of diagnostic traits within the cultural complexes or phases compared within the different areas and periods (MacNeish 1959). Comparisons of the various traditions with each other and with cultural manifestations in eastern Asia are the basis for speculations about how these traditions came into being and spread.

Since in the companion monograph by Raup, Johnson, and others the geology, physiography, botany, ethnography, and other aspects of the southwest Yukon have been described, this introductory section is followed by a description of my excavations including an account of the stratigraphy,

archaeological techniques, and artifacts. Also the relation of the site to the topography is explained. This further illustrates some of the concepts I have attempted to describe above. The section will be concluded with a summary statement and reconstruction of the way of life of the peoples represented by the archaeological phases and complexes. Supplementing this data is an appendix describing the artifact types and traits. The third section is concerned with chronology and dating. The book concludes with a correlation of the cultural relationships of the prehistoric manifestations of the southwest Yukon and speculations concerning the peopling of the New World.

THE EXCAVATION OF THE STRATIFIED SITES

The Gladstone Site JhVq-1

The Gladstone site is located on the northeast side of Kluane Lake about midway between its two extremities (Figs. 1; 17; 18). The site is just east of where Gladstone Creek enters Kluane Lake. It is on the first prominent point extending southward into the bay in front of the creek. The site is located at the edge of a terrace about eighty feet high overlooking the lake and extends westward to include the highest terrace prominence along the northeast shore between Gladstone Creek and Talbot Arm. This high terrace, though it may have served as a lake beach, was originally a lateral moraine which the lake has eroded into a steep cliff along its southern edge. North from the edge of the terrace the ground slopes off very slightly, thereby leaving an eroding ridge at the edge. On the face of the terrace, vegetation is absent. Trees are relatively rare along the edge on top of the terrace, but 15 to 30 feet back from the edge vegetation is dense (Fig. 55A).

These features of topography and vegetation combine to make the edge of the terrace a perfect highway for game as well as a natural look-out for animals on the terrace as well as along the lake shore nearby. To illustrate the fact that our site was on a game trail, let me digress for a moment to relate an incident which happened during excavation. One afternoon, when a limited crew was working at the site, a small grizzly bear used this game trail. The path, of course, took him right through our test excavations. When the alarm "BEAR!"was given, the workers reacted in rather different ways. The local worker took off to look for a rifle which was in camp two miles away. The young college student leaped down the bank and searched for a tall tree at the water's edge where they are rare. A high school student from the city uttered "Oh, nonsense, " or an equivalent field camp expression, and kept on troweling away in the bottom of his square while the bear ambled right on by.

To return to archaeology, it was the members of the Andover-Harvard Yukon Expedition who first discovered the site in 1948. At that time they collected 24 artifacts in the sites at the top of the bank in front of the site. In the following season, Dr. D. Leechman, of the National Museum, revisited the site and collected a few more artifacts. Further, Leechman noted that the tools seemed to be eroding out of the red brown soil of Kluane silt underneath the volcanic ash. In 1959, I collected a few artifacts and cleaned off a portion of the site at the top of the terrace. In troweling, it was noted that some of the artifacts were being unearthed at the very top of the mature soils under the volcanic ash. Because the artifacts from this site were the basis for the establishment of the "Gladstone complex" in my initial analysis of materials in 1957, it was decided

Fig. 55. The Gladstone site: A. The Gladstone site from the prominence to the west; B. The west-east S10 profile of the east trench showing a Kluane phase side scraper in Zone G, the gray zone of the Kluane silt; C. The west end of the N10 profile of the main trench showing bones in Zone C.


A
B
C

to excavate fully this type locus, and we did so, from June 30 to August 2, 1960 (MacNeish 1960). The terms for the silts and the various zones in the soil profile which I mentioned above and will refer to later have been described and discussed by Johnson and Raup in the preceding paper in this volume.

We staked out the area, approximately along its cardinal axis, and set up a series of five-foot test squares (Fig. 56). The initial test squares were cut either in from the bank at points where cultural refuse could be seen in the profile or in areas where the bank had yielded artifacts on the surface. These initial tests occurred at S15E205, S15E170, S10E120, S5E80, S10E45, S15E10, S10W35, S5W90, and S70W670. Since only about half of these yielded artifacts, we put in a number of other tests back in the trees away from the bank. These were in squares N15E205, N20E155, N15E105, N15E55, N15E5, N15W45, N45E105, N4E55, N45E5, N70E5, N115E5, and N90E50. These proved to be less productive squares than the four best ones along the edge of the bank. In fact, only two produced more than two artifacts!

For this reason, we moved our endeavors back to the four tests at the edge of the bank, and began expanding these five-foot squares into trenches. The trench that resulted from expanding square S15E170 included squares S15E155, S15E160, S15E165, S15E175, S15E180, S10E170, S10E165, and S10E175. It was referred to as the east trench in our field notes (Fig. 57). Our technique of digging was to excavate from the edge of the bank stripping off each soil zone, one at a time. In all, seven zones lettered A to G were identified. Initially, we worked in three alternate squares S15E160, S15E170, S15E180. When these were excavated, squares S15E165 and S15E175 were taken out. In this way we had a maximum number of profiles from which to extend the excavation as well as twenty-five feet of the S10 profile to draw and photograph. It included some of the artifacts in situ (Fig. 55B; 57). Later we dug S10E165 and S10E175 and, finally S10E170. We stopped at this juncture because we found few artifacts in the last three squares.

In excavating we usually removed the humus (Zone A) and underlying loess or windblown sand (Zone B) with a shovel down to a depth of about 1 1/2 feet. Previous tests had taught us that it was sterile of human remains. Next, the three inch layer of burned earth, Zone C, was stripped off by trowel, even though only one chip occurred in it in this trench. The volcanic ash (Zone D) and underlying brown soil (Zone E), each about one inch thick were removed quickly by trowel. Then by working from the peripheries of the square, we carefully troweled off by vertical slices the red brown silt of Zone F. In all but the northernmost three squares, chips and bone appeared at about a depth of two inches below the top of the reddish brown silt. At about S12E168 there was a concentration of fire-cracked rock and burned soil which we believe was a hearth. Surrounding this hearth and at the same level in square S15E170, as well as in the adjacent parts of S15E180 and S15E175 were microblades, blades, side scrapers, a Besant point fragment, a

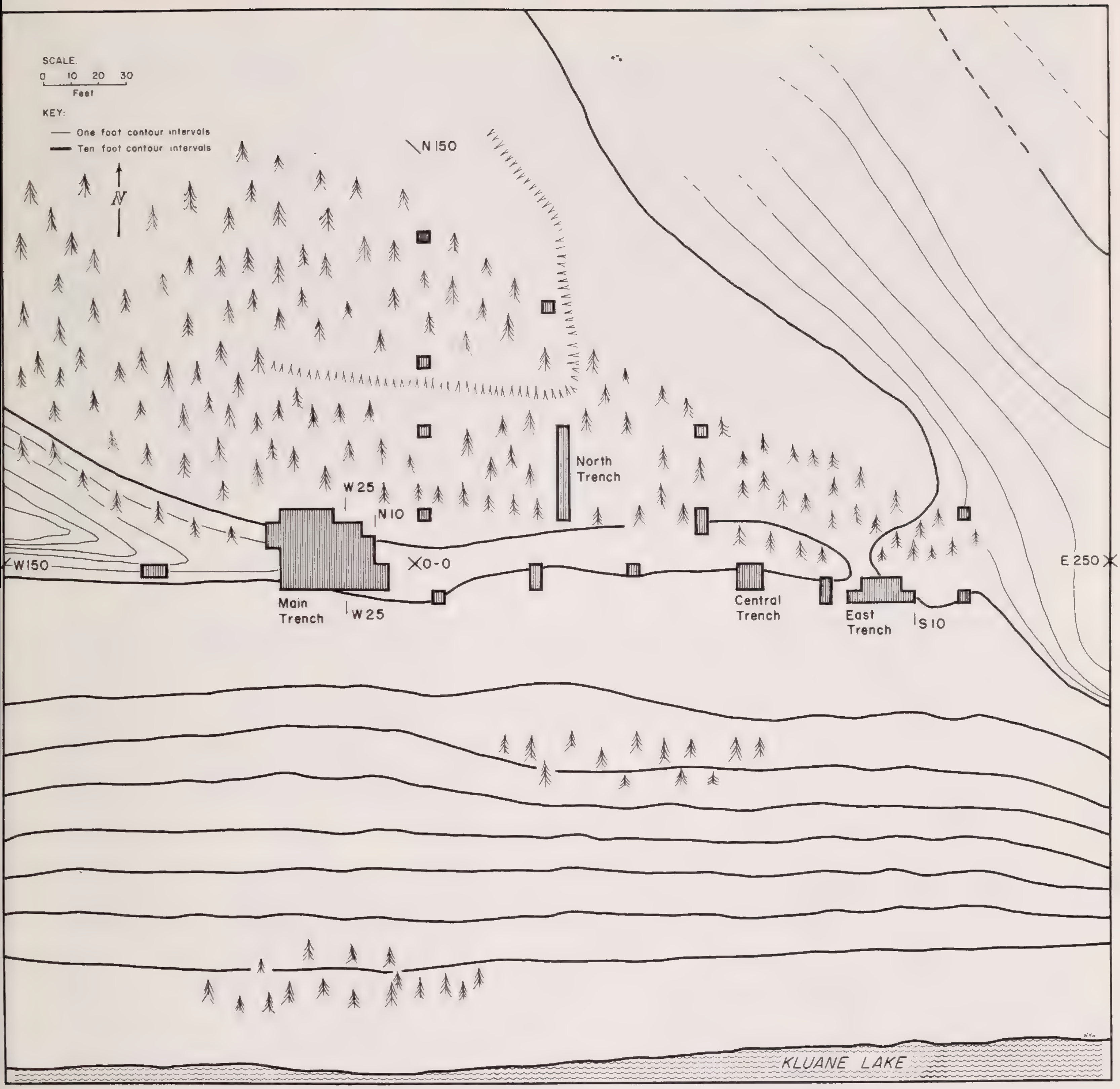


Fig. 56. Contour map of the Gladstone site with areas of excavation indicated.

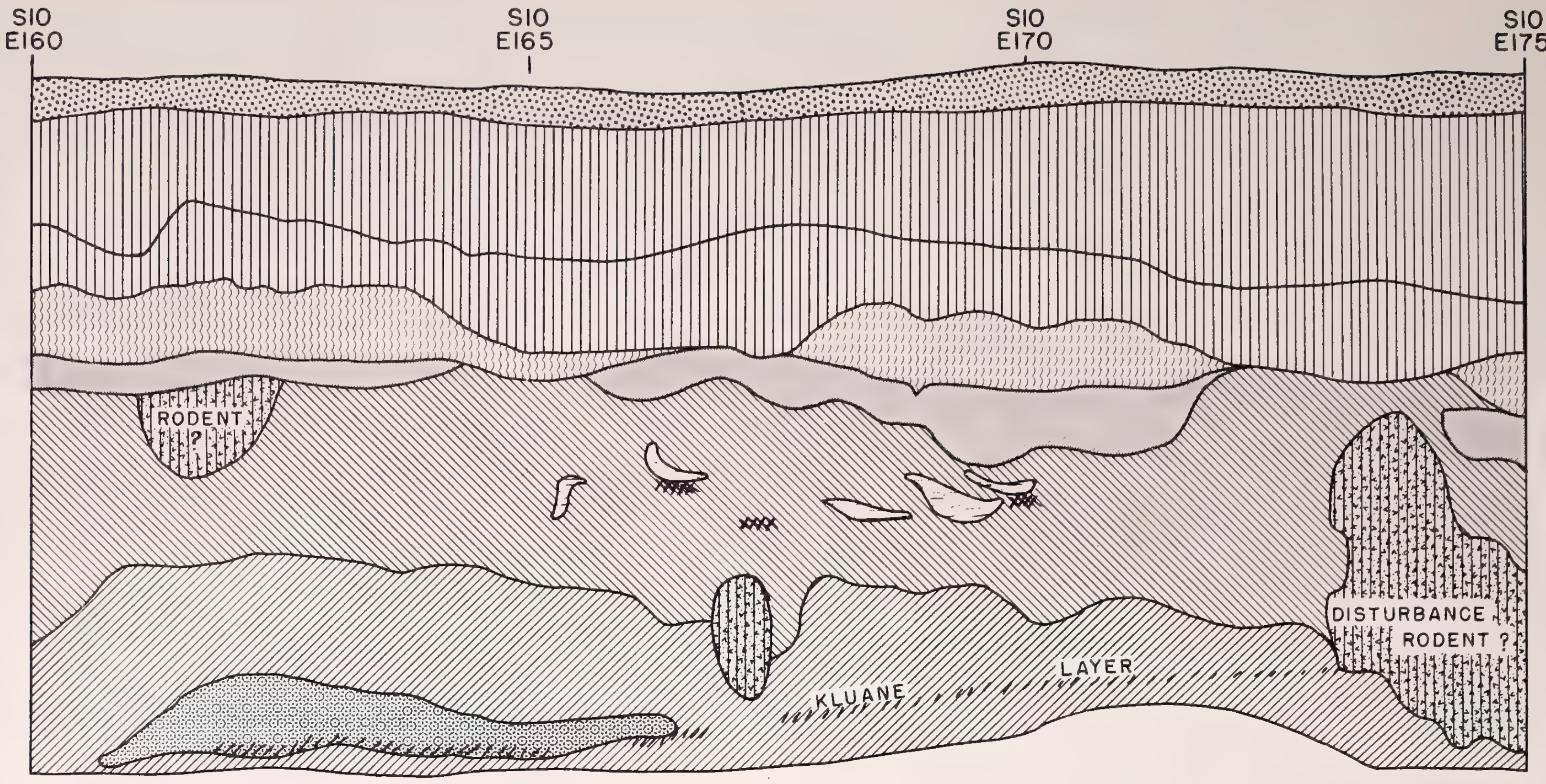


Fig. 57. The Gladstone site. West-east S10 profile of the east trench, Vertical scale is double horizontal.

Zone A. Humus.

Zone F. Reddish brown silt.

Zone B. Gray silt.

Zone G. Yellow silt.

Zone C. Gray silt and brown soil.

Calcareous soil.

Zone D. Volcanic ash.

Mixed volcanic ash, gray silt and brown soil.

Sand lens.

flat-topped end scraper, some fragments of bone and moose (?) antler. We believe these remains in the top of Zone F represent a short occupation by a very small group, perhaps as the result of a moose kill. Although the sample is meager, the artifacts as well as their stratigraphic position suggest that the occupation was a Gladstone pure component.

After the one-foot-thick brown layer was removed by trowel, we then excavated the underlying gray soil (Zone G) to a depth of about one foot. In Zone G was found a thin (1 1/2 inch) layer of charcoal about four inches below the bottom of the reddish brown soils (Zone F). This layer or floor covered a half-moon shaped area (half of it having been eroded away) about sixteen feet long (from S15E157 to S15E173) and about seven feet wide (from S15E160 to S8E160). Randomly distributed throughout this floor were a few chips while near S12E168 were twelve artifacts. These included two Lerma-like point fragments, a scraper plane, blades, choppers, and side scrapers. These artifacts on the well-defined floor, plus another seven found just off the floor, comprise a possible component of the poorly-defined Kluane complex. This again appears to have been a short occupation by a small probably hunting group (Fig. 55B).

The expansion of square S10E120 to include S10E125, S5E120, and S5E125 is referred to as the central trench or area (Fig. 58B, C). It was dug in the same manner as previously described. All artifacts and most of the bones and chips came from a small circular area with its center at about S7E119. In the northern part of this area was a hearth filled with burned bone and fire-cracked rock. Its center occurred at S6E118. Just east, in the area between S5 and S6 and E118 and E119, were six cache blades or bifacial knives and five side scrapers. All artifacts, bone, and fire-cracked rock were located between one and five inches below the top of reddish brown soil of Zone F. The hearth and caches were carefully cleaned off and a floor plan made and photographs taken (Fig. 58B). No other artifacts or human remains were found either above or below this feature. Here again is evidence of a short occupation by a small group. One bird bone (duck?) suggests it perhaps took place during a summer hunt. Its stratigraphic position, plus the square-based knives, suggest a Gladstone occupation, perhaps contemporaneous with that in the east trench.

The north trench was five feet wide, and extended from square N15E5. A few chips and generalized artifacts occurred in the upper three inches of Zone F, but there was nothing one could call an occupation area, and these may very well represent residual material from the nearby west and central areas.

Up on top of the high prominence, next to S70W670, five more squares (S70W675, S70W680, S60W680, S65W680, and S65W675) were excavated to form the west trench (or a site numbered JhVq-2). Excavation was made from the edge of the precipitous bank in the same manner as in the east trench. Chips and artifacts appeared between two and four inches below the top of the reddish brown soils of Zone F which lay directly under the volcanic ash designated Zone D, with no intervening

Fig. 58. The Gladstone Site: A. West-east N10 profile of main trench with arrow, lower, left, pointing at artifact in situ in Zone F1; B. Floor plan of central trench with artifacts of the cache. Arrows connect artifacts on the floor with the cross sections, Fig. C; C. South profile of the central trench with artifacts of cache on platforms.


A
B
C

brown soils which when found were lettered Zone E. Chips and bone were found in all squares, but all the artifacts recovered and a hearth came from S70W670 and S70W675, in an area about seven feet long and three feet wide. Artifacts included: blades, microblades, flat-topped end scrapers, spokeshaves, Destruction, Morhiss and Agate Basin points, side scrapers, and biface fragments. A few bird bones suggest a short summer occupation by a small group. The artifact types and their stratigraphic position show it to have been a Gladstone component, perhaps contemporaneous with those in the central, east, and west trenches.

The final trench was called the main trench (Fig. 56). It was much larger and richer in artifacts than the others and encompassed an area from roughly the S10 profile to the N20 profile, from W15 to W50. Again our technique of excavation was similar to that of the east trench but on a grander scale.

In this area, seven artifacts and some burned bones and antler appeared in four adjacent squares in Zone C, that is, the burned layer above the volcanic ash (Fig. 55C). The round plano-convex end scraper and antler point as well as the stratigraphic position suggest that perhaps it was a small Aishihik component. The antler might be caribou, and if so it was a winter occupation.

The bulk of the artifacts, as well as bones, chips, fire-cracked rock, and charcoal for the whole site, however, came from between two and four inches below the top of the red brown soil (Zone F1) in this main trench (Figs. 58A; 59; 60). In the southern half of the trench, the artifacts seemed to be in a definite layer, and there is little doubt that they were all laid down at the same time. Bird bones and net sinkers indicate this occupation took place during the summer. Most of the artifacts were scattered at random throughout the trench in the same stratigraphic position. A definite hearth of fire-cracked rock appeared in N5W25. Also in S5W30, S5W40, and S10W35 we found a semi-lunar-shaped area of scattered fire-cracked rock on top of a thin burned layer. The two extremities of this region had patches of ash, suggesting two hearths. In square S5W90 was another area of burned bone, ash, and fire-cracked rock. Cleaning the profile revealed that these areas belonged to the same layer as the semi-lunar one. Thus, there seems to have been a short summer occupation by a group large enough to have used four cooking areas or fireplaces. If the occupations of the east, central, and far west trenches were connected then it was an even larger group. Certainly the artifacts themselves, the very similar stratigraphic positions, and the various indications of occupation during the summer seem to suggest that all could have been connected.

The projectile points and bones of larger mammals show that one of the main activities during the occupation of Zone F1 was hunting. The great number of scrapers and biface knives indicate that animal meat and skins were being prepared for food and clothing. Net sinkers may indicate fishing. The polyhedral cores, microblades, chips, and spokeshaves illustrate the fact that some time was spent in flint knapping.

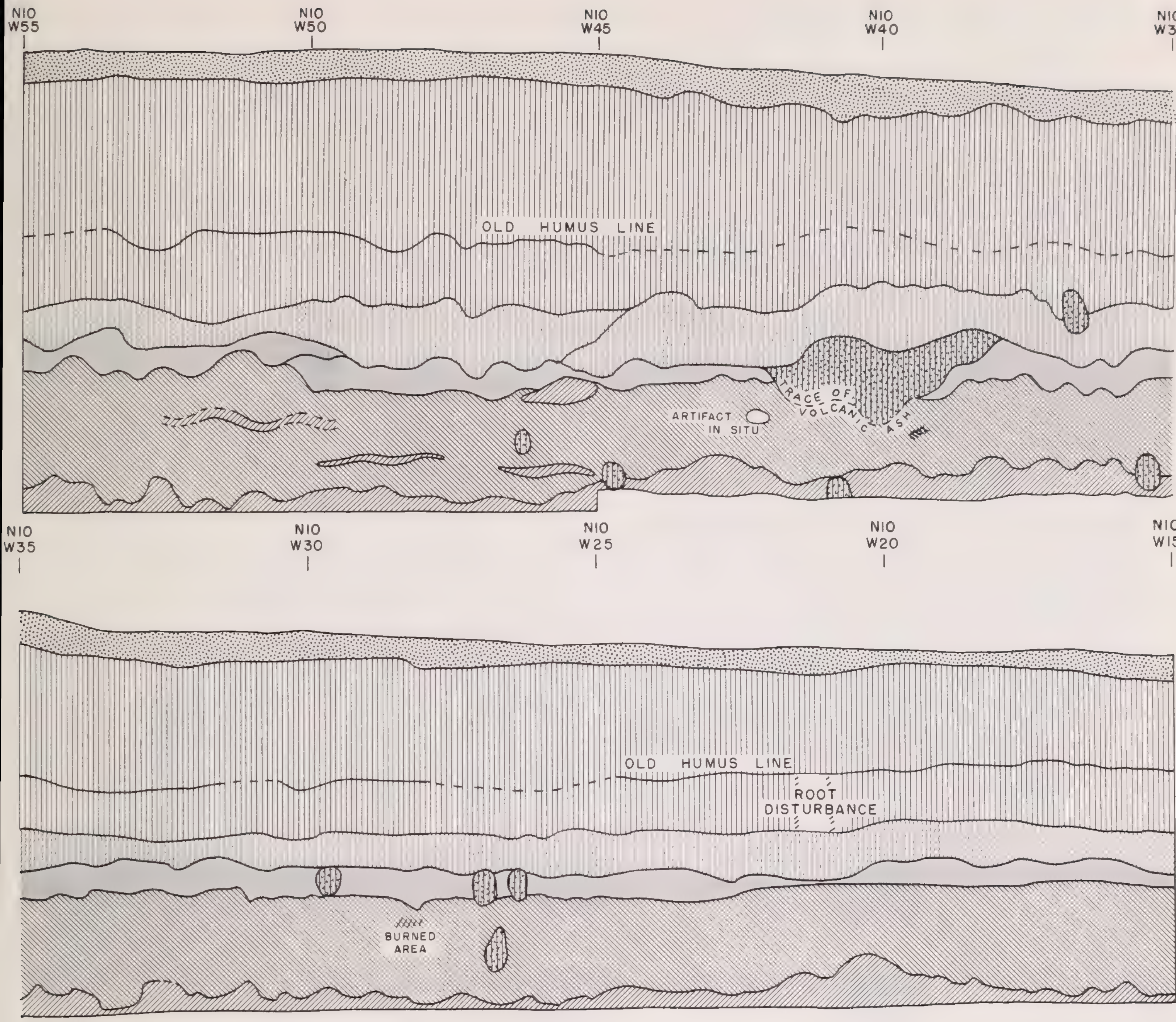


Fig. 59. The Gladstone site. West-east N10 profile of the main trench. Vertical scale is double horizontal.

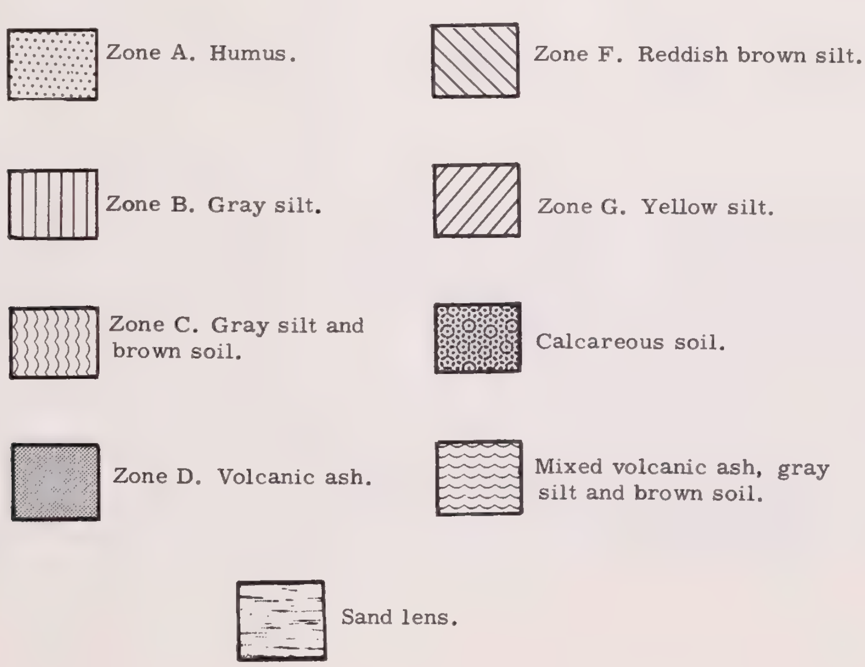
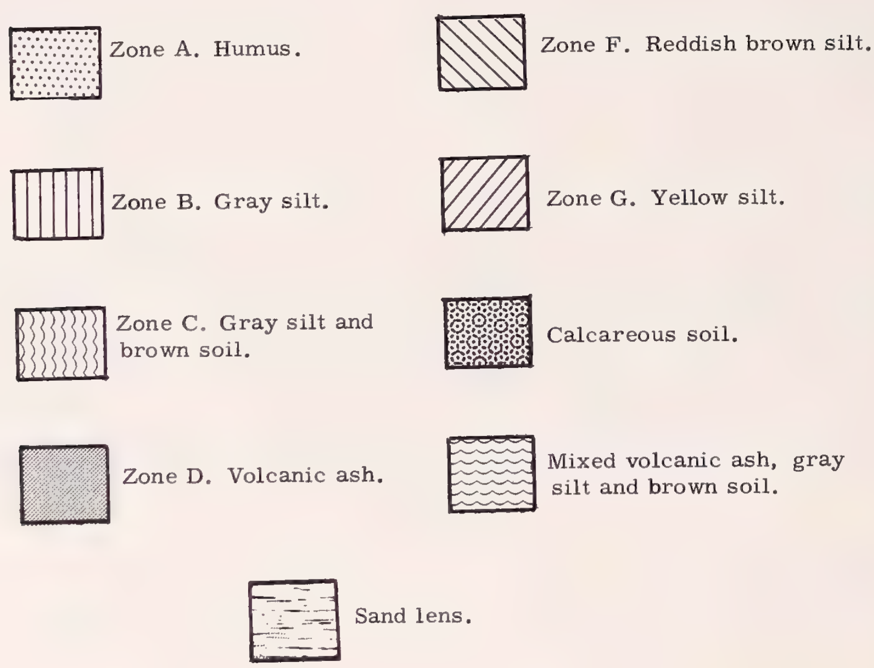
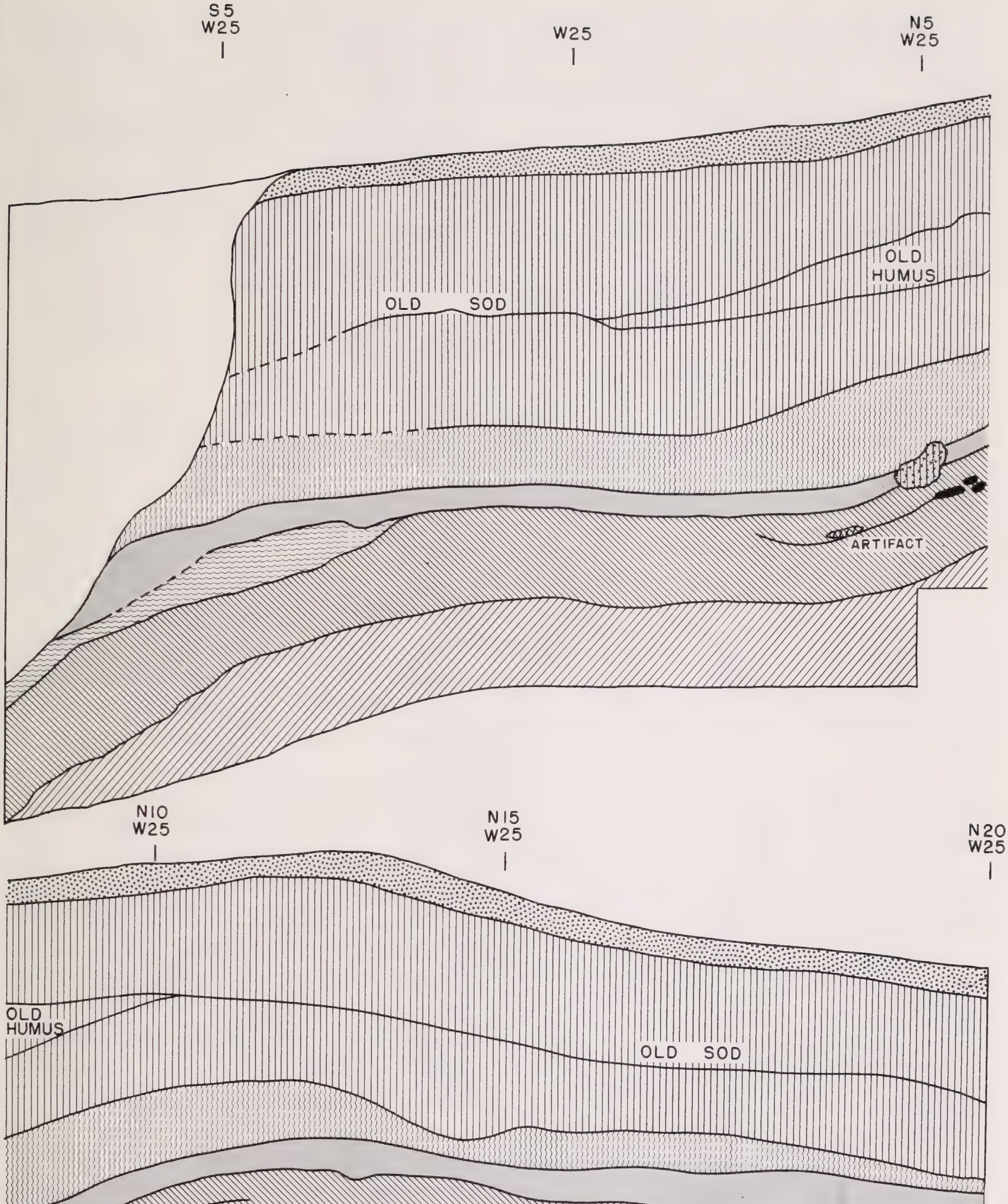


Fig. 60. The Gladstone site. South-north W25 profile of main trench. Vertical scale is double horizontal.




S5
W25
W25
N5
W25
OLD
HUMUS
OLD SOD
ARTIFACT
N10
W25
N15
W25
N20
W25
OLD
HUMUS
OLD SOD
ARTIFACT

The predominance of flat-topped end scrapers, square-based knives, spokeshaves, conical, tongue and tabular polyhedral cores, equal proportions of blades and microblades, burins made on projectile points, and the Morhiss, Besant, Destruction, Refugio, and Anderson points indicate that this occupation in the upper part of Zone F of the Gladstone site was a pure component of the Gladstone phase.

Summary. During the time when the Kluane silt was first being blown onto the Gladstone site, a small group of hunters using a few tools belonging to the Kluane complex stopped at the site briefly.

Near the end of the period of deposition of Kluane silt, a band of people were scattered along this site for a summer while they hunted, fished, butchered game, prepared skins, and made artifacts. The complex of tools they used is classified as the Gladstone phase.

After the volcanic ash had been deposited on the site, a small group of hunters using tools belonging to the Aishihik complex stopped there during the winter.

The Pelly Farm Site KfVd-2

The Pelly Farm is situated on the north bank of the Pelly River about three miles before its confluence with the Yukon River. A 60-foot-high terrace runs along the foot of the hills northwest of the farm. It is separated from the present river by a flood plain about a mile wide. This flood plain includes the remains of a number of meander-channels and the terrace borders the northernmost of them. One mile west of the farm houses and about half a mile north of the volcanic butte that ends the terrace, a small stream has cut through this scarp (Fig. 61A). An area the junction of the top of the terrace and the north side of this stream cut is littered with bones and chips. These extend for a distance of about two hundred feet and is the area we designate the site. The top of the terrace along the Pelly is a game trail and the present-day wandering cattle have beaten a path along it. The extension of the terrace along the small stream forms another trail leading both to the mountain, and to the old Dawson City trail. I suspect that in times past this was part of a game crossing. The top and face of the terrace is relatively free of trees and the sides of the hills to the north of the site are grass covered and excellent pasture for cattle (Fig. 61A).

This site was found in the 1957 survey when bones were noticed eroding out of the bank in a cow path. An Agate Basin point was found on the western terrace area which was designated as KfVe-1. By the end of the 1960 season, we still had not been able to find a pure component of the Champagne complex worth excavation and so it was decided to test this site briefly on the way to Dawson City. At the end of the first day, it was apparent that the site was stratified and had at least two components of the Champagne complex. Therefore, our planned one-day visit lasted from August fourth to the seventeenth. In our first excavation, we tried

four tests quite widely separated in squares S15E5, S10E55, S10E75, and S20W40. In 1961, further tests were made in S20W60, S20W100, S5W130, W140, N40W150, and N50W190 (Fig. 62). These were all excavated by trowel in levels roughly paralleling the surface. Besides finding artifacts we hoped to get a good vertical profile showing stratigraphy.

Both squares S10E55 and S10E75 have two rather distinctive cultural strata in them. The top stratum was about three inches thick under a foot of sand, which in turn lay under a small humus layer. This first floor which later was designated floor three contained a few artifacts and bones. Under this first cultural layer there was from two to six inches of yellow sand underlaid by a two inch thick charcoal layer which blended into a two to six inch layer of burned sand. This later was numbered floor five. Both charcoal and burned layers contained a considerable amount of bone but only a few artifacts. Because of the stratigraphy we connected our two test squares to form the twenty-five foot long east trench. One new feature was that a small lens-like burned floor, numbered four, appeared between the top and bottom floors in the center of the trench. It also was separated from the lowest floor by a stratum of sticky loess two inches thick. In taking off the humus, a few chips were found (Fig. 64).

The central test at S15E5 was extremely similar to that of the east trench. A few chips appeared in the humus, then about one foot deep was a burned floor (floor three). At a depth of about one foot and a half, two more floors (floors four and five) appeared. Artifacts were again relatively rare. Test squares S20W100, S5W130, W140, N40W150, and N50W190, while having five floors, had few tools.

The tests at S20W40 and S20W60 were, however, extremely productive, both of the number of strata and of artifacts and bones from each stratum (Fig. 61B, C). For this reason these squares were connected into a trench, and the trench was dug northward to be our major area of excavation. In total, fifty-one squares were dug in the area from the S25 axis to roughly the N10 axis and from W40 to roughly W75 (Figs. 64; 63). In this main trench, the humus was two to three inches thick and in it were microscopic specks of volcanic ash. Directly under the humus, in the northwest half of the trench, was an area of burned sand with bones and stone tools. This had not appeared in either the central or east tests. It is designated floor one. It seems to encompass a relatively large area as it extends from the main trench to N40W150, and includes four hearths and a pit. Bones of moose, caribou, sheep or goat, rabbits and birds characteristic of the summer season were uncovered. It may be that this was a summer hunting camp of a relatively large group of people. Only one hundred fifty-nine artifacts occurred in our limited excavations. On the basis of the nineteen bifaces, three spokeshaves, thick side scrapers with one or two edges retouched, three chi-thos, ten flat-topped end scrapers, a Refugio point and three end-of-blade scrapers, a fibula awl, sixteen microblades, thirty blades, and a conical and tabular core, it has been tentatively classified as a Taye

Fig. 61. The Pelly Farm site: A. A view of the Pelly Farm site from the east, arrow indicates its location; B. South-north profile showing the occupational zones lying out at edge of bank to left; C. West-east profile showing the five occupational zones.


A


B


C

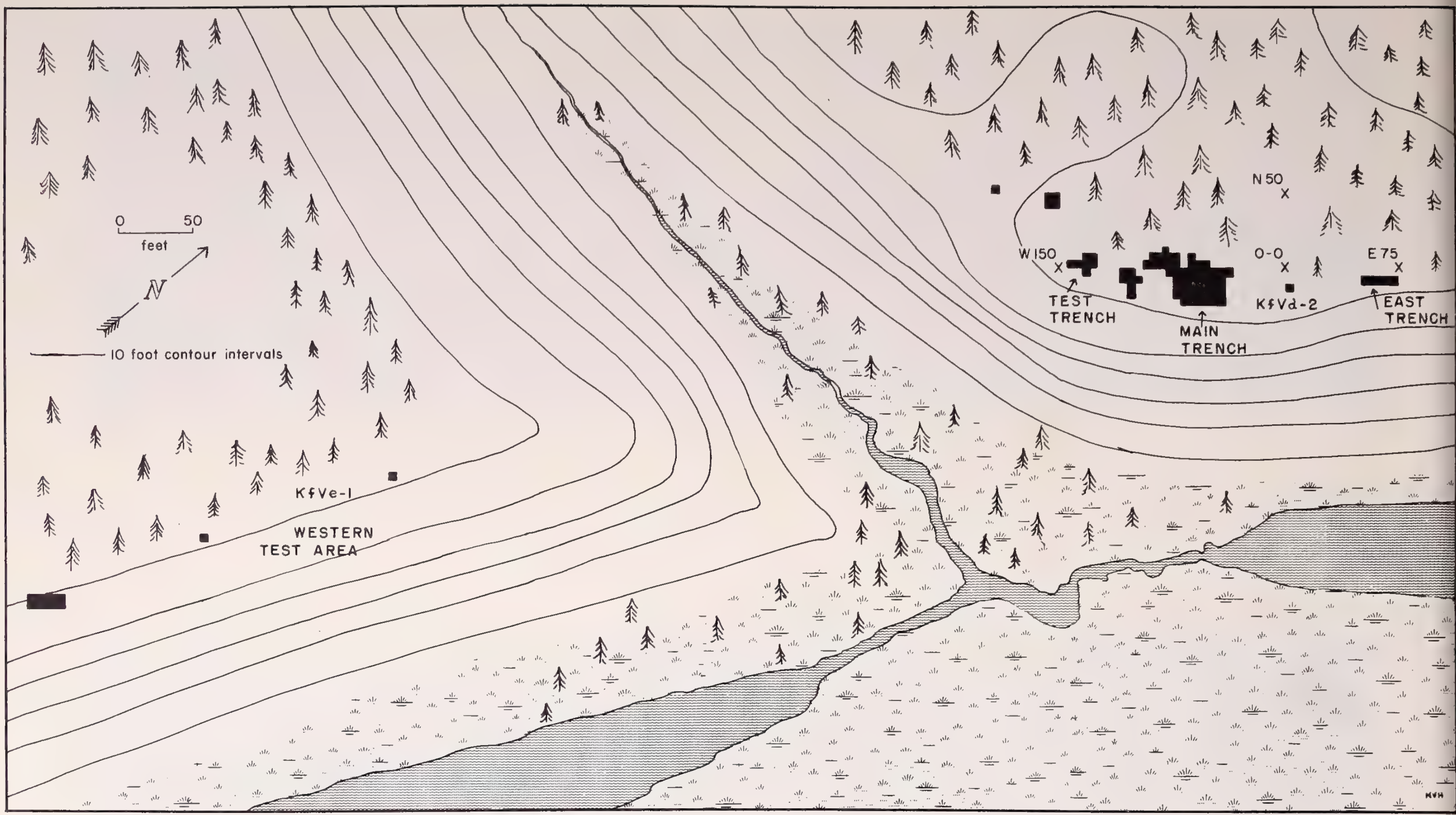


Fig. 62. Contour map of Pelly Farm site and western terrace (KfVe-1) showing areas excavated.

Lake component. In addition, more generalized artifacts were found such as side scrapers, pebble hammers, pebble choppers, and a split pebble chopper. All these tools seem to have been connected with hunting, butchering or working skins -- the sort of activities one might expect at a temporary summer hunting camp.

In the southwest part of the main trench, at a depth of between nine and twelve inches below pale sands, there was another burned stratum. Its depth, structure, and artifacts revealed that it is probably not connected with the upper occupation in the central and east tests and it just barely extended to square W125. The relatively small area covered by the refuse in the burned stratum, plus the presence of only one bison bone and one caribou antler, would seem to indicate floor two was a winter camp made by a microband. The thirty-one artifacts include eighteen classifiable ones, i.e., a Lockhart point, three microblades, five blades, three flat-topped end scrapers, one keeled end scraper and five crude plano-convex end scrapers indicating floor two is a probable component of the Gladstone phase.

Directly under floor two, separated by about two inches of sand, was another charcoal layer. This was one inch thick and was called floor three. This connected with the upper floor in the east trench, as well as extending into square W140. Although hearths were not seen, it is inferred that floor three was deposited by a macroband. Bison, wolf, bear, and bird bones suggest a short summer occupancy. The two Agate

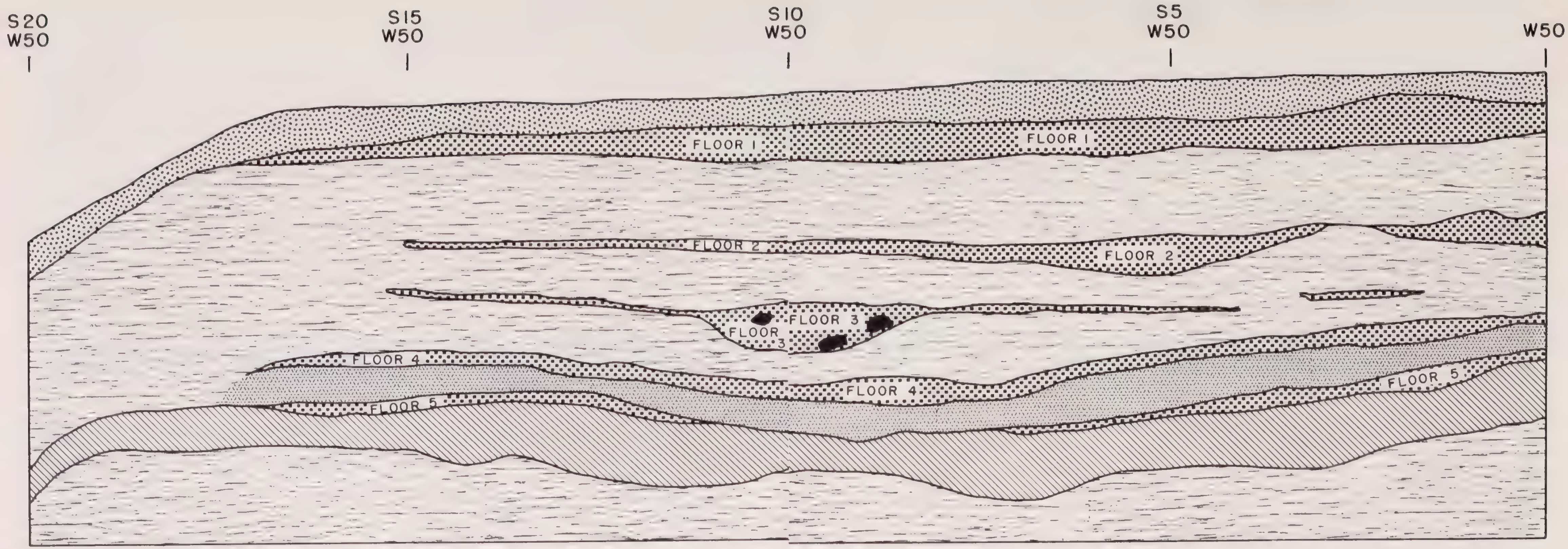


Fig. 63. Pelly Farm site. Eastern sector, south-north W50 profile in the main trench from S20 to 0. Vertical scale is double horizontal.

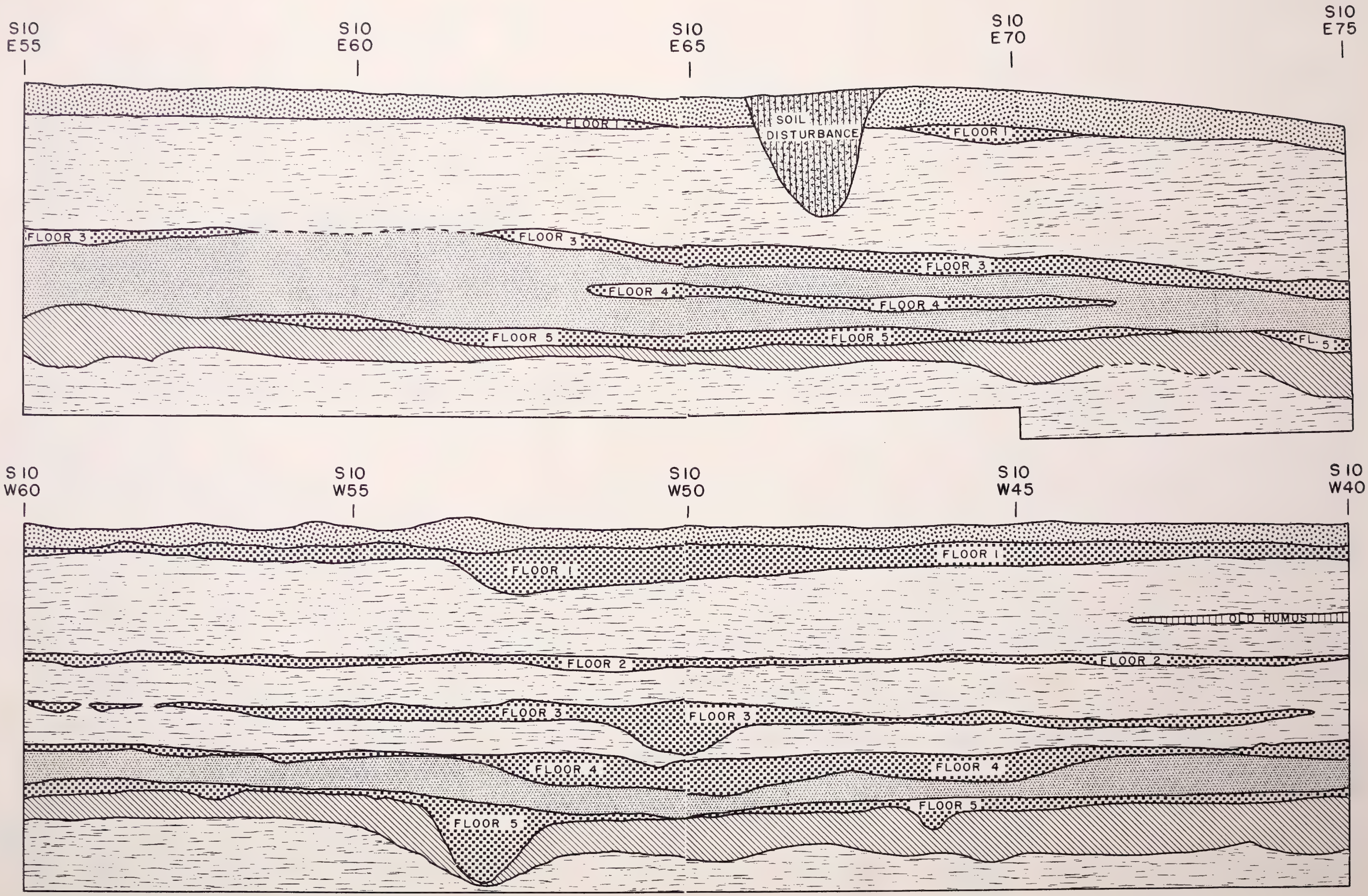

S10 E55
S10 E60
S10 E65
S10 E70
S10 E75
SOIL DISTURBANCE
FLOOR 1
FLOOR 1
FLOOR 3
FLOOR 3
FLOOR 3
FLOOR 4
FLOOR 4
FLOOR 5
FLOOR 5
FL. 5
S10 W60
S10 W55
S10 W50
S10 W45
S10 W40
OLD HUMUS
FLOOR 1
FLOOR 1
FLOOR 2
FLOOR 2
FLOOR 3
FLOOR 3
FLOOR 4
FLOOR 4
FLOOR 5
FLOOR 5

Fig. 64. The Pelly Farm site (KfVd-2), eastern sector: West-east profile along S10 in the east trench from E55 to E75 and in the main trench from W40 to W60.

Basin points, eight microblades, twelve blades, one Fort Liard burin, the unifacial drill, and keeled and flat-topped end scrapers, serrated scrapers, three biface choppers, and four split pebble choppers hint that floor three was a probable component of the Little Arm phase.

Underneath floor three there was from three to six inches of yellow sand over a definite thin charcoal and burned sand stratum called floor four. It connects with the rather patchy charcoal stratum found in the adjacent tests and appears to have been deposited by a macroband. Bones were particularly numerous in the floor and it had the appearance of having been a butchering area. Bones were mainly of large animals including muskox, bison, elk, and caribou. Small animals were represented by only a few bones of beaver, a few bones of rabbit, and a leg bone of some water fowl. The artifacts comprise a distinctive complex, and floor four is considered to be a pure component of the Champagne phase. Particularly diagnostic are the two Pelly and six Agate Basin points, the Fort Liard burin, the seven keeled end scrapers, forty-five split pebble choppers, the biface choppers, a fibula awl, and the four large relatively crude blades. Other more generalized tools also were present.

Underneath floor four was a sticky yellowish-gray silty level that overlay floor five which was a thicker burned stratum appearing in all tests. It contained fewer elk and buffalo bones and artifacts than the layer above which suggests that only a microband lived on this stratum. Artifacts included a bone point, three Pelly points, nine Agate Basin points, an artifact burin, a notched hammer, four split pebble choppers, a keeled end blade, two ovid bifaces, a graver, three blades, a fibula awl, four pebble hammers, and two side scrapers. This points to an occupation of a microband in the winter by the Champagne peoples.

Summary. The first occupation was on floor five by a small group of hunters during a winter game kill of bison and elk. They seem to have had a material culture which may be classified as belonging to the Champagne phase. After a thin layer of sand had been blown onto this first floor a number of families with a similar cultural complex settled for a summer to hunt, kill, and butcher such animals as muskox, bison, elk, caribou, beaver, and birds. They established floor four. Again sand blew onto this floor and, after a time, another macroband settled on the site during the summer making floor three. They were hunters of bison, bear, and wolf. Their material remains, however, suggest that they had a cultural complex which we have classified as being in the Little Arm phase. After another period of shifting sands floor three became buried. Then floor two in the area was lived upon by a small group of winter bison and caribou hunters. Although meager, the inventory of artifacts from this floor points to the fact that these may have been Gladstone peoples. After a somewhat longer time interval, during which sand again blew on the site, a macroband camped during the spring or summer to leave behind floor one. These people hunted and butchered moose, and caribou and as well, trapped and skinned goat, sheep, and rabbits. The

Fig. 65. Contour map of Little Arm site, JiVs-1.

artifacts reveal that this final occupancy was a probable component of the Taye Lake phase. After they left, the modern humus plus some volcanic ash covered their remains.

The Little Arm Site JiVs-1

This site is located on the east side of Kluane Lake and directly across from the mouth of Kluane River. It is situated on a point north of the large bay locally called Jacquot Bay, and just south of the point that marks the beginning of the Little Arm of Kluane Lake. The Little Arm has recently been renamed Brooks Arm.

The site itself is on a small half-moon- shaped terrace having an irregular surface about twelve to seventeen feet above the lake (Fig. 65). The convex part of the half-moon projects southward towards the lake; the straighter northern edge of the half-moon terrace slopes gently off into an ancient stream channel. One suspects that the site may have been a half-moon-shaped island at the end of a peninsula during prehistoric times. The northern part of the bench has a number of large trees on it, but the central and southeast portions are bare and the southwest portion has only a few willows and four large spruce trees. This lack of sheltering vegetation makes it a mosquito-less camping spot during the summer because of an ever-prevailing breeze from the lake. The site is also adjacent to a number of deep pools in the lake which yield large, delicious fish. This location is an excellent lookout from which to see game along the shores of the lake.

Frederick Johnson, of the R. S. Peabody Foundation, and the Andover-Harvard Yukon expedition passed by this site, JiVs-1, on the way to their excavations in 1944 on the next point north along the lake. Evidently at that time few artifacts were to be seen on the surface. D. Leechman, of the National Museum of Canada, visited the site in 1945 and collected a number of artifacts from new erosions. In 1957 my party visited this location, mistakenly thinking it was the site of Johnson's excavations. and found about thirty artifacts. We also cleaned off a small section of the bank and found artifacts, both above and below the volcanic ash. This incidence of cultural stratigraphy was the reason for excavating the site in 1959, 1960, and for one day in 1961.

Initially, in 1959, we took a number of pictures of the site before excavation and made a one-foot contour map. Then we set up stakes along the cardinal axis. Next we decided to spot-test the area to determine the spots which would be most productive of archaeological data.

Our first tests were along the bank's edge in squares E100, S20W145, S35W100, S45W45, S55, and S45E50. Except for the last square, few artifacts occurred in any one square, although there were hints that prehistoric occupations existed both before and after the deposition of the volcanic ash.

The artifacts consisted of only a few scrapers and chi-thos in Zone A,

the humus, a couple of bifaces and end scrapers in Zone E, the Slims river silt which was just under Zone D, the volcanic ash. A few microblades were found in the top of the underlying reddish brown Kluane silt designated Zone F1; and scrapers, a net sinker and a couple of microblades in Zone F2 the lowest part of the reddish brown silt just above Zone G the yellow zone of the Kluane silt. The cross-sections in these test excavations were analogous to those eventually found in the east and west trenches (Figs. 66 to 70). S45E50 was a most productive square, but much to the disgust of my workers, it was decided to test the interior of the site further before expanding it into the east trench. Thus we excavated squares W145, S5W54, S5, N50, S5E55, E100, and S5W100. Again only the last square was productive. The other squares contained a few utilized flakes and a side-notched point in the humus, a utilized flake from the brown soil, Zone E, and microblades and a Flint Creek burin from the lowest part of the reddish brown soils.

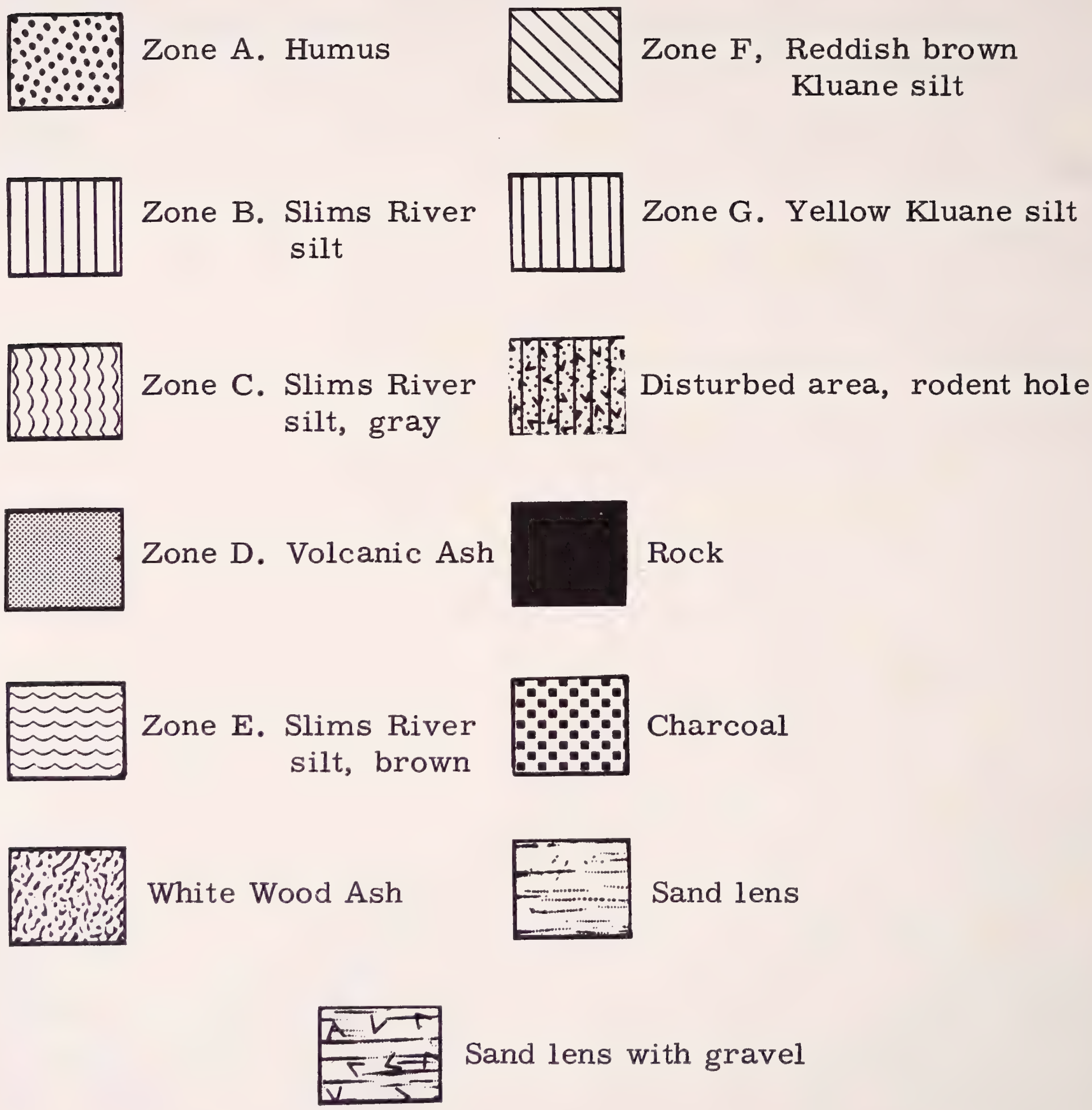
In digging these test squares we excavated with trowels, stripping the soil off horizontally and working down from above. Materials were bagged according to layer and squares and the horizontal position of artifacts was recorded. This technique left something to be desired, in that by working down from above it was difficult to determine exactly the irregular lower limits of the various layers.

For this reason, when we started to excavate the east trench, we changed our technique (Fig. 71). Since square S45E50 had produced cultural material from the various layers, we decided to dig the square just south of it, namely S50E50. In digging it, we worked from the south face of square S45E50, and troweled off the humus in the northern half. The Slims River silt under the humus and ash was removed by the same method. Later, the brown and reddish brown silts were excavated so that we had a new profile 2 1/2 feet south of square S45E50. Then, using the same method, we removed the rest of the square. Such a method had a number of advantages. We could always see the soil zones in cross-section and could easily determine their lower limits; stratigraphic and horizontal locations of artifacts were easily recorded; if we cared to take pictures the artifacts appeared with the stratum as its background; and finally, we were never working or walking on top of layers containing artifacts.

Once S50E50 was finished, we expanded eastward and westward into squares S50E45, S50E40, and S50E35 using the same technique. It gave us a 25-foot trench and both the north and south walls were sketched and photographed with some of the artifacts left in situ. North-south profiles of each square were drawn as they were completed. Such a technique, including the photos, drawings, horizontal recording of the artifacts, and daily field notes, gave us good archaeological control.

Once squares S55E50 and S55E45 had been removed, alternate squares S45E60, S45E50, S45E40, and S45E30 were dug by the same technique, then the in-between squares S45E35, S45E45, and S45E55 were excavated to form a new trench and profile that were recorded.

Fig. 66. The Little Arm site. West-east S40 profile of east trench. Vertical scale is double horizontal.



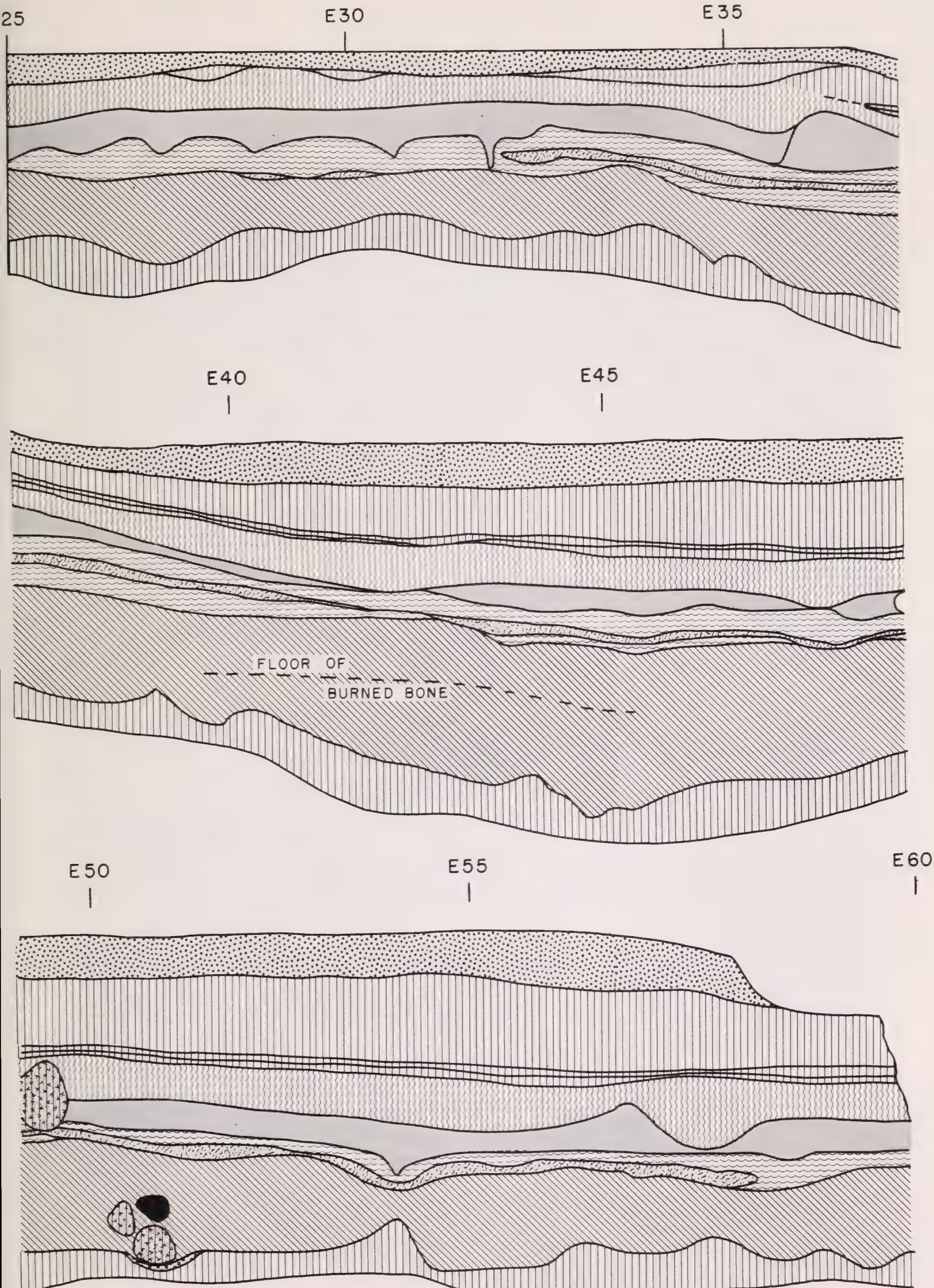
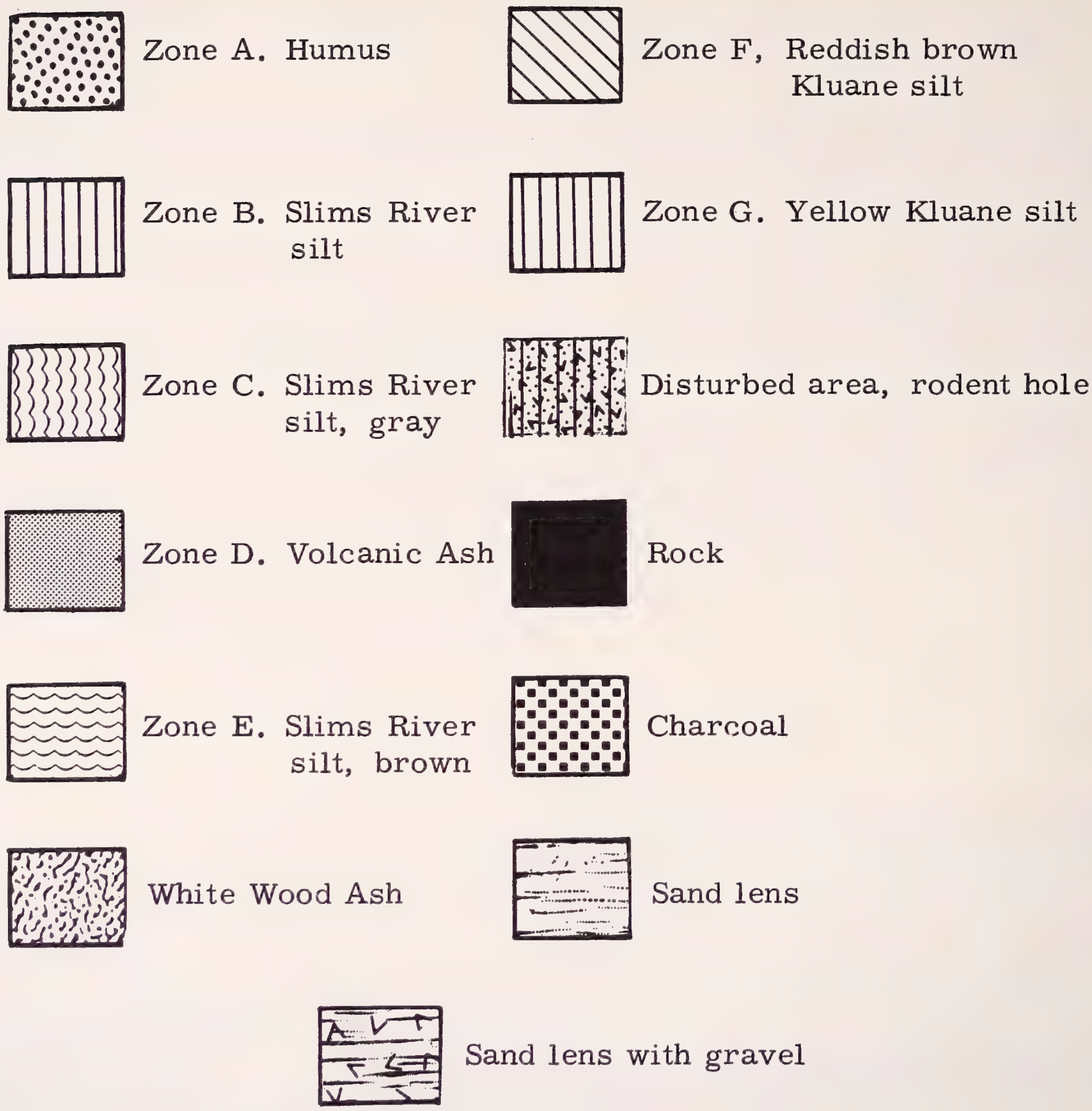
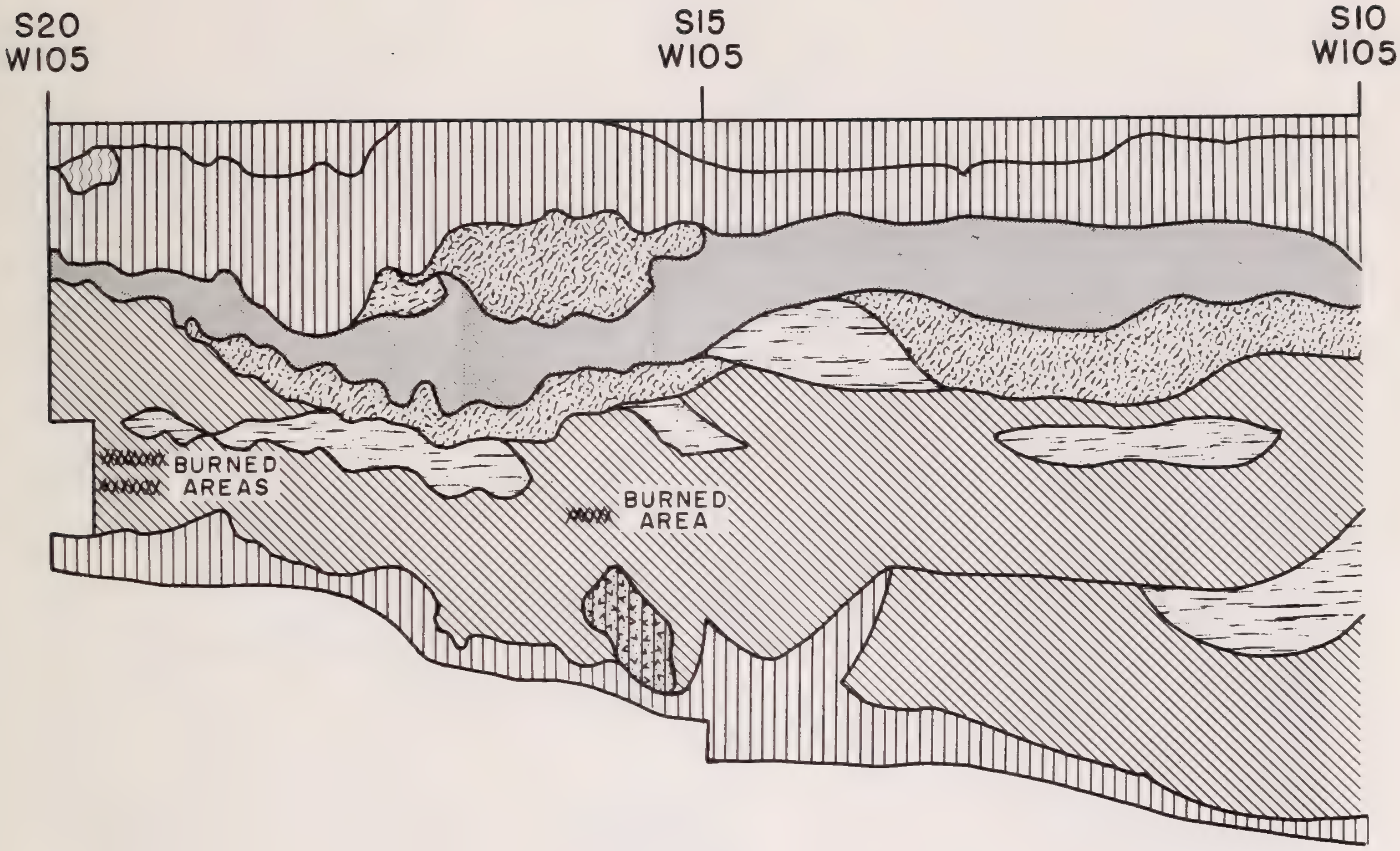

25
E30
E35
E40
E45
FLOOR OF
BURNED BONE
E50
E55
E60

Fig. 67. Little Arm site. North-south W105 profile in the west trench of JiVs-1. Vertical scale is double horizontal.




S20
W105
S15
W105
S10
W105
BURNED
AREAS
BURNED
AREA

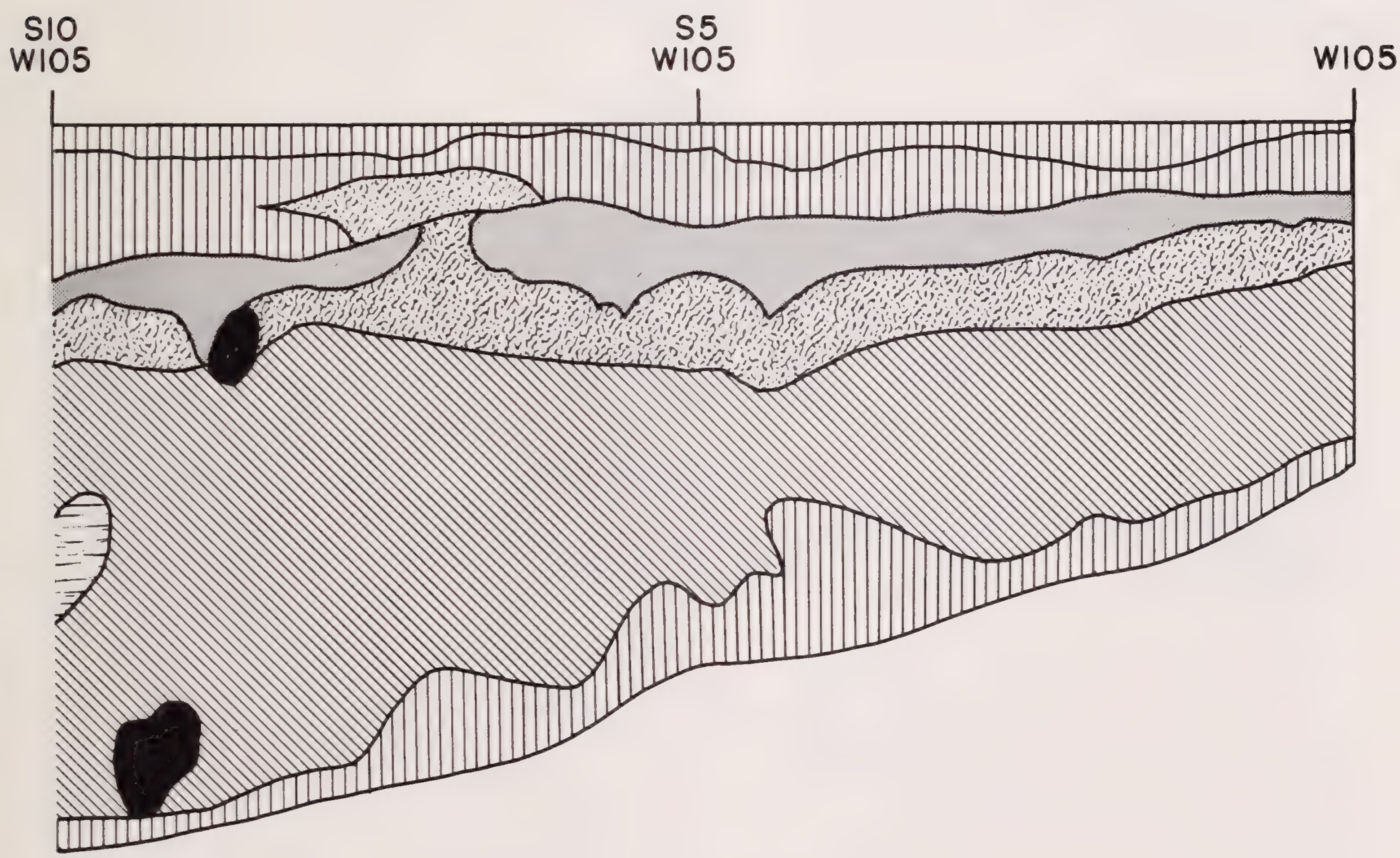

S10
W105
S5
W105
W105

Fig. 68. Little Arm site. South-north W100 profile in the west trench of JiVs-1. Vertical Scale is double horizontal.

Zone A. Humus

Zone B. Slims River silt

Zone C. Slims River silt, gray

Zone D. Volcanic Ash

Zone E. Slims River silt, brown

White Wood Ash

Zone F, Reddish brown Kluane silt

Zone G. Yellow Kluane silt

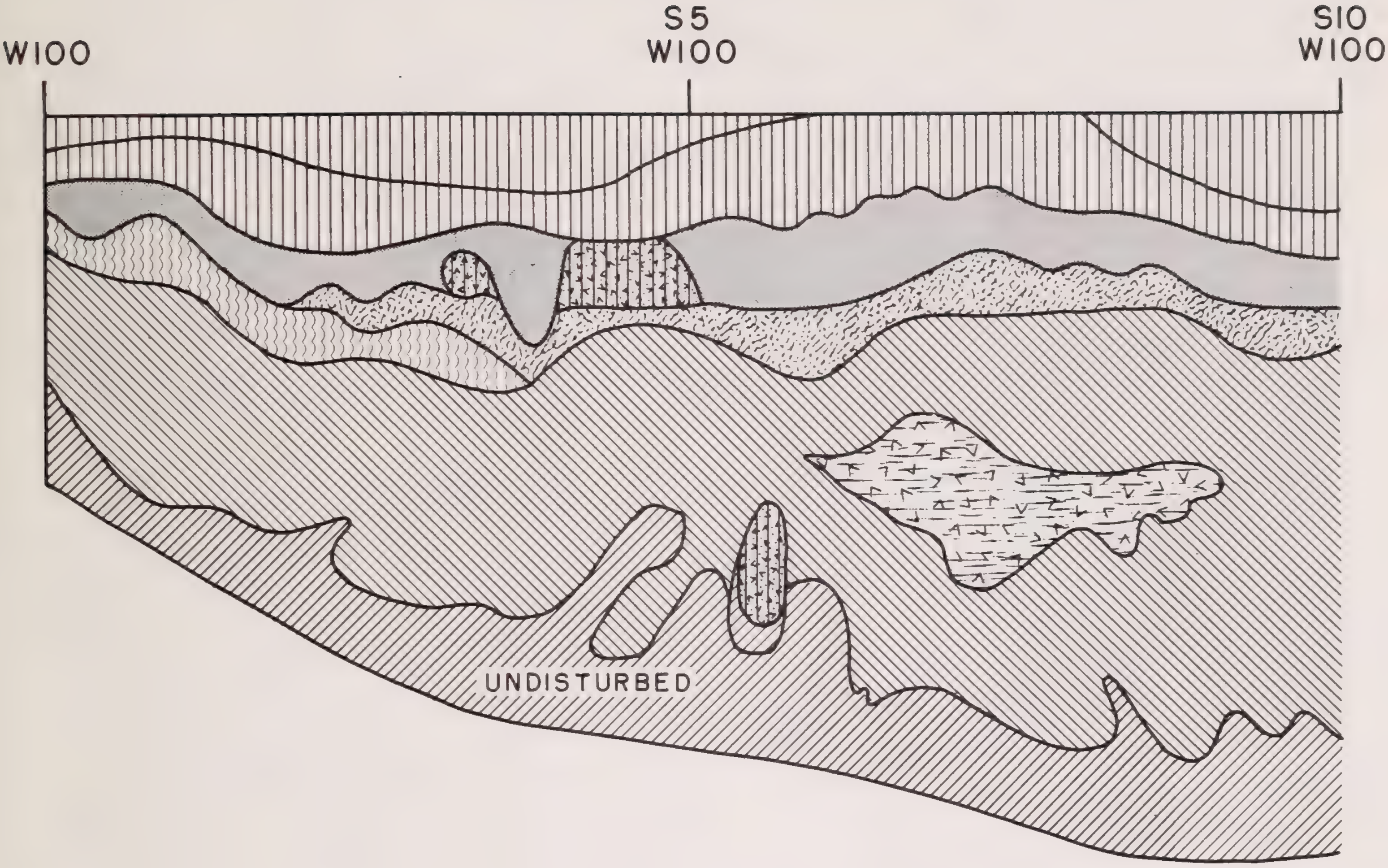
Disturbed area, rodent hole

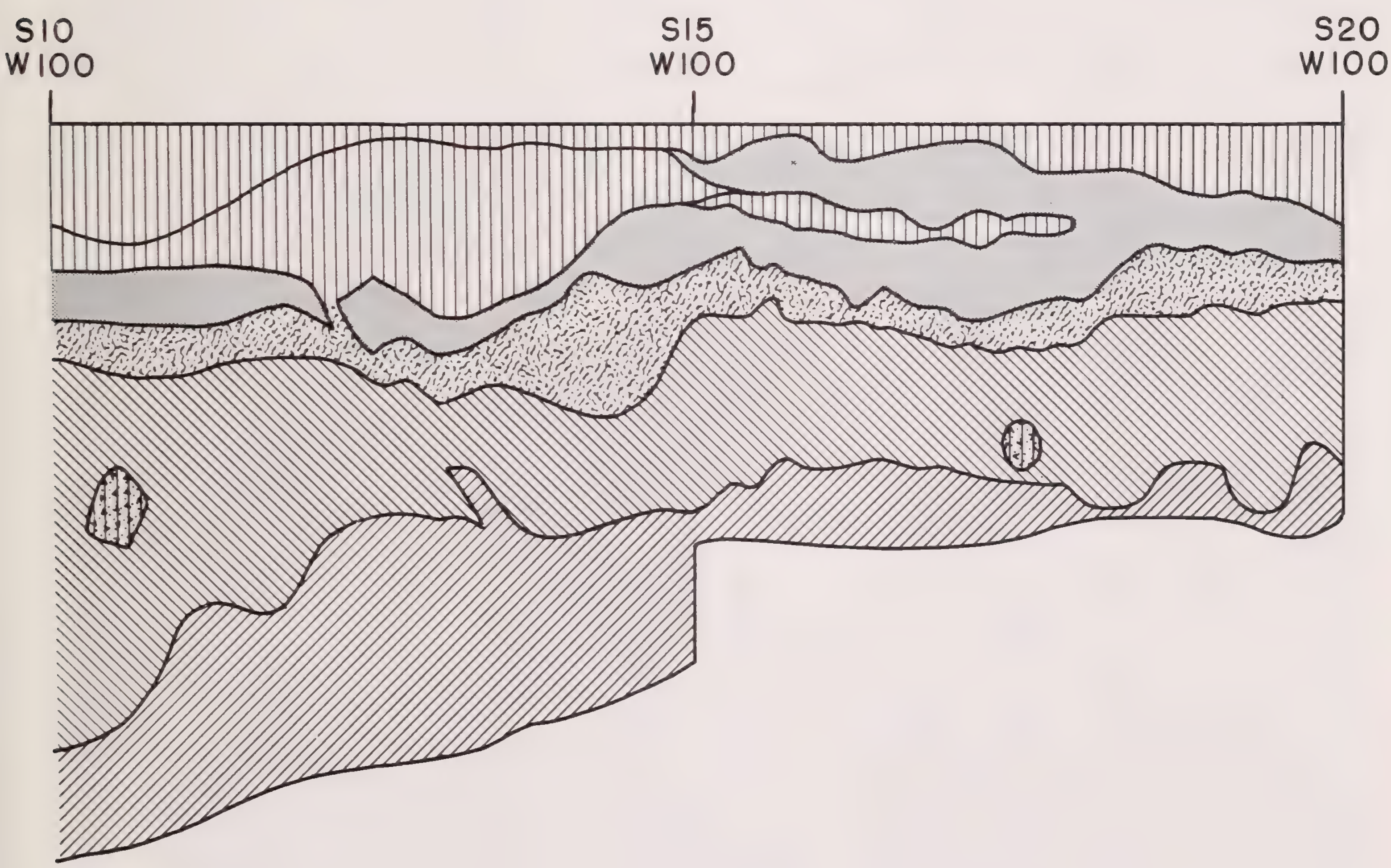
Rock

Charcoal

Sand lens

Sand lens with gravel


W100
S5
W100
S10
W100
UNDISTURBED


S10
W100
S15
W100
S20
W100

Later with the same technique we excavated a series of S40 squares from S40E30 to S40E65.

Although we recorded all artifacts by level, layer, and horizontal position, the most important aspect of this east trench was its cultural stratigraphy (Figs. 66; 69B).

In the east trench, a few artifacts were found in a lens just at the bottom of Zone A, the humus or occasionally in a layer under silt, below the humus (Fig. 69A, B). This cultural stratum is designated Zone B (Fig. 69C). Its thinness suggested a short occupation, and fish scales and bird bones indicated a summer occupancy. The lens appeared in all test trenches. What is more, the artifacts in it, and in its equivalent in the west trench, were almost the same. Artifacts found included such hunting and fishing implements as Catan arrow points, antler barbed arrows, antler leisters, and copper gorges. Interestingly enough, most of the bones found were of small animals such as rabbits, rodents, and beaver. There were a few moose bones and we infer trapping was more important than hunting. Most of the other artifacts could be connected with the preparation of skins or clothing, and included chi-thos, side scrapers, copper pins and awls, biface knives, small half-moon side blades, thumbnail end scrapers, and copper tinklers. All artifacts mentioned allow Zone B to be classified as a "pure" component of the Bennett Lake phase.

Underneath these remains were lenses of windblown sand comprising Zone C. This was one to six inches thick and in turn overlay Zone D, a layer of volcanic ash from one-half to three inches thick. Underneath it was a brown humus-like silt which included lenses of ash in its lower sections (Fig. 69B). A few artifacts were found in Zone E. Those classified were blades and a few microblades, an end-of-blade scraper, a side scraper, a crude plano-convex end scraper, and a Whitehorse point. The latter two artifacts hint that Zone E might tentatively be classified as of the Taye Lake phase. As we shall see later, the artifacts were related to materials in the west trench. However, the scarcity of artifacts in Zone E, the relatively thin occupation layer and a duck bone may indicate a short summer occupation by a small group.

Underneath the brown soils of Zone E was the reddish brown silt of Zone F (Fig. 69). In an area about 12 feet in diameter centering in square S45E50, about three inches from the top of these soils was a thin stratum including burned bone and a series of artifacts. I have interpreted this bone layer, Zone F1, as being the refuse from a seasonal, single-tent or one family occupation. An antler bilateral unibarbed fish spear suggests summer occupation. The character of the artifacts indicate hunting, fishing, butchering, and the manufacture of tools, such as microblades and blades from conical or tongue-shaped polyhedral cores. Other artifacts were Fort Liard burins, burin spalls, end-of-blade, ovoid plano-convex and flat-topped end scrapers, side scrapers ovoid biface, bifacial choppers, Agate Basin points and Morhiss points. This may be classified as a Gladstone phase assemblage.

Under Zone F1 were found artifacts in the lower two or three inches

of the reddish brown soils (Fig. 69A, D). This occupation layer, if it was such, was called Zone F2. Artifacts were concentrated in the south-eastern part of the east trench and seemed to be connected with artifacts at the same level throughout the site. Characteristically they were micro-blades (Fig. 69D). In the center of two of the richest concentrations of microblades were two tongue-shaped cores and a conical polyhedral core. Another tongue-shaped core was located in an area without many micro-blades or blades. Other tools were less numerous but included side scrapers, serrated scrapers, flake end scrapers, an end-of-blade scraper, Fort Liard-type burins, an Anakutuvuk burin, a bifacial drill, Agate Basin points, and a piece of a possible net sinker. The artifacts belong to the Little Arm phase. The net sinker, if it is one, suggests a summer occupation.

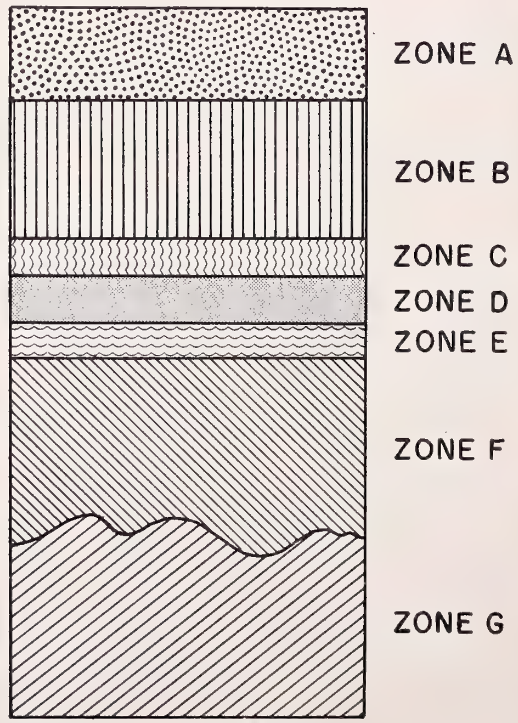
The other main excavation was the west trench which was opened because of the significance of finds in test square S5W100 (Fig. 65). In it we had found a few artifacts in the humus, in the upper part of the reddish brown soils (F1), and three in the lower reddish brown mature soils (F2). More important and unique was the fact that on the north side of the square the mature soils were only about eight inches thick but on the south side they were nineteen inches thick (Fig. 70B). In our initial testing such odd stratigraphy had not been of particular interest, but after excavation of many more squares it stood out as a unique feature, and my curiosity was piqued. Therefore, late in the season of 1959, we extended this square southward to include S10W100 and S15W100. Although artifacts were numerous, the problem of the thickening reddish brown soils was not solved. Still curious, we returned to it in June of 1960.

When we came back we dug two parallel trenches, one including squares S5W90, S10W90, and S15W90 as well as S5W110, S10W110, and S15W110 (Fig. 70C). We photographed the long profiles, extended the center trench to include S20W100, and removed the squares in between the three trenches. The same vertical slicing excavation technique continued.

Stratigraphy was even more clear-cut in this west trench than it had been in the east one (Figs. 70A; 67; 68). Over much of the region the humus had been burned off, probably due to a forest fire. Right under the burned humus was an ashy-dark layer called Zone B, which was occasionally separated from the burned humus by lenses of windblown sand. From our spot test trenches as well as from the character of the stratum itself, there is little doubt that this burned stratum connects with Zone B of the east trench. As far as the west trench is concerned, this zone had more concentrated refuse and this concentration covered an area about 60 feet in diameter. At S35W144, at S4W93, and at S12W107 were found great masses of fire-cracked rock, burned bone, and fired earth, the remains of at least three hearths. From the above data Zone B looks as if it had been lived in by a large group for a season. Identification of the many fragments reveals the presence of ducks, geese and other summer birds which indicate occupation during the summer. Although there


A
ZONE A
ZONE B
ZONE C
ZONE D
ZONE E
ZONE F
ZONE G


B
JiVs-1
S35


ZONE A
ZONE B
ZONE C
ZONE D
ZONE E
ZONE F
ZONE G

C


D

Fig. 69. Little Arm site: A. Cross section of South 35 profile in the east trench, arrows point to artifacts in situ; B. Arrows point to artifacts in Zones B and E; C. Diagram of soil profile; D. Artifacts in Zones F1 and F2.

Fig. 70. The Little Arm site: A. The stratigraphy in W105 in west trench showing features in Zone F2; B. The stratigraphy in W100 in west trench; C. The three parallel trenches of the west trench at the Little Arm site.


A
B
C

Fig. 71. Little Arm site: Excavation technique in east trench.

are a few fragments of moose bones and antler, the greater proportion of osteological material is of small mammals such as rabbits, rodents, marten, and beaver. This certainly would indicate that part of their subsistence was based on trapping. However, the moose fragments and Stott points would seem to be evidence of some big game hunting. A few fish scales and a fragment of an antler leister suggest some reliance upon fishing. The most common implements in the west trench of Zone B were chi-thos and thumbnail end scrapers. A few fragments of bone awls and side scrapers were also found. It is my impression that during summer occupations one of the main activities was preparing skins and making clothes for the fierce winter ahead. The copper tinklers and bird bone beads may have decorated their clothes. The artifacts mentioned above are reason for classifying the occupation of Zone B as a pure Bennett Lake component.

Underneath the Bennett Lake remains was the volcanic ash, Zone D which overlay the brown soils including the ash lenses of Zone E. The sand lenses of Zone C were absent in the west trench. Generally speaking, Zone E was not rich in artifacts. Those found came from an area ten feet in diameter around S10W105 where there was a hearth, a great quantity of burned antler, and some fragments of burned moose skull or skulls. One of the local Indians thought that the antler was summer moose antler, but I was unable to determine his reasons for such an opinion. The depth of the deposit and small area of occupation certainly indicate that only a small group stayed here for less than a season, perhaps a summer. The tabular polyhedral core, spokeshave, blades, flat-topped end scrapers, pointed flake graver, Whitehorse point and bifaces, all indicate a Taye Lake occupation.

Below this occupation, in the top four inches of the reddish brown silt of Zone F and above patches of sand and gravel, were a large number of artifacts randomly distributed throughout the Subzone F1. There was no well-defined floor as in the last trench, and there was no way of telling whether the occupations seen in the east and west trenches in Zone F1 were contemporaneous with each other. The artifacts are, however, very similar, and both may be classified as Gladstone phase. In the charts and artifact descriptions I have lumped them together as a single occupation, but they may well have been two separate seasonal occupations by people with the same material culture. The chi-thos, Morhiss, Besant, Refugio, and Anderson points, conical core, microblades and blades were the Gladstone phase artifacts uncovered.

Underneath the Gladstone materials of Zone F1, a complicated stratigraphic situation appeared (Figs. 70A, B; 67, 68). On the east, north, and south edges of the west trench, the lower part of Zone F (F2) was about four inches thick and was directly under F1. Occasionally there was a streak of sand separating the two. From the east edge of the trench (at the W90 axis at about S7) the bottom of the reddish brown silts thickened, and became even darker red in color and the overlying patches of sand and gravel became more pronounced until the two parts

were 16 inches thick at S7W105 (Fig. 70A; 67). Along the north and south edges this thickening of Zone F2 was abrupt along the S3 and S12 axes. The end result was that the F2 zone made a long elliptical depression with gradually sloping walls on the east end and on the west end though this latter was not fully excavated. There were steep walls on the north and south edges. Overlying this depression were contorted patches of sand and gravel. In addition, in the center of the depression at S7W96 there were three fire-cracked rocks and some ash (Fig. 70D). Just what this feature meant I never have determined to my complete satisfaction.

One possibility is that this is a long pit house with a central fireplace which the aborigines had excavated and lived in and that the sand and gravel were part of the collapsed roofing material. Against this hypothesis is the complete lack of postholes for which we really looked carefully. Also, the lack of a well-defined floor around the fire-cracked rock, and the fact that the artifacts did not appear to have been deposited on any sort of regular surface. In fact, many of the micro-blades lay with their main axes oriented vertically. Another possibility is that this was a natural irregular depression having an irregular surface in which the people camped and built a hearth which they later buried or covered with sand and gravel. Another possibility is that this was a natural depression in which they lived which somehow became covered by sand and gravel by natural processes such as unusual wind action or perhaps tree throw. Quite frankly, the absence of bedding of the sands, the huge size of some of the pebbles, and the fact that deposits of sand and gravel are lens-shaped, similar to loading in Indian burial mounds, strongly argues against natural deposition. Thus, somewhat by default I am left with the second hypothesis.

Be that as it may, this depression of Zone F2 was loaded with artifacts. One of these broken artifacts, an end scraper, fitted together with a piece of broken end scraper from the east trench, leaving little doubt as to the contemporaneity of the two artifact concentrations. Further, the total artifact complex of Zone F2 in the west trench was very similar to that of F2 in the east trench and both belonged to the Little Arm phase. Artifacts of the west trench included: split pebble and bifacial choppers, tongue-shaped polyhedral cores, blades and microblades, Anaktuvuk burins made on microblades, flake drills, gravers, Fort Liard burins, burin spalls, Agate Basin and Milnesand points, side scrapers, chi-thos and keeled and neatly chipped large end scrapers.

Summary. We see the Little Arm people moving in during the first period of silt deposition. The occupation was perhaps during a summer season as suggested by the net sinkers and bird bones. There were at least two living areas, one in the east part of the east trench and another in a depression in the center of the west trench. In addition to fishing, the Milnesand and Agate Basin points show that they did some hunting. Keeled, end-of-blade scrapers, large neatly chipped and thin flake end scrapers, side scrapers, perforators, chi-thos and flake drills illustrate that the people worked skins. Serrated scrapers, burins, polyhedral cores, blades and microblades indicate that tools were also manufactured.

Later, near the end of the initial period of silt deposition, the Gladstone peoples occupied the site either once or twice, probably in the summer. Their cultural activities were much the same as those of the Little Arm peoples but their tools were different -- stemmed and notched atlatl or spear points were now used, conical and tabular cores resulted in microblades, barbed antler points were present and end-of-blade and flat-topped end scrapers were more prevalent.

As the first of the Slims River silt was forming, that is, the brown silt which marks the beginning of the second period of loess deposit, a small group of Taye Lake people stopped briefly during a summer. Their tools were again different, and there is no evidence that their subsistence was anything but hunting, although their other activities were about the same. New kinds of tools included tabular cores and blades, crude plano-convex end scrapers, and Whitehorse points. A few of the more general tools used in earlier times continued.

Between the Taye Lake and the later Bennett Lake occupation, a considerable amount of time may have elapsed. During the intervening years, a volcanic explosion had blanketed the area with ash, then silt had been blown onto the ash. This final occupation took place during a summer by a band or by a group of families. Although their activities were very similar to the earliest occupation, their tools and ways of manufacturing them were dissimilar. They fished, not only with nets but with leister spears and by the use of lines tipped with copper or antler gorges. Animals were hunted with the bow and arrow. Arrow points were not only chipped by a very different technique but also were fashioned from copper, bone, and antler. Trapping of small game also seemed to be more important. Skin clothing was still made, but the end scrapers were small, chi-thos were more commonly used, their awls or drills were of antler, bone or copper, and some clothes were decorated and pinned with copper artifacts. Artifacts were often manufactured by grinding, hammering, and polishing, which was now as important as chipping, drilling, splitting, or grooving. This culture was the kind which the white man found when he arrived.

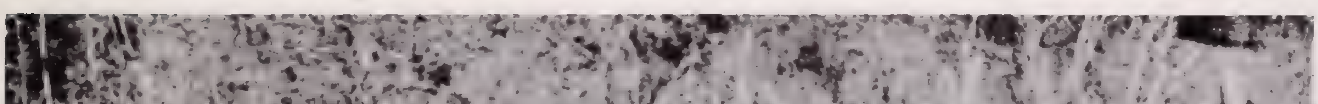
The Canyon Creek Site JfVg-1

This site was situated on the high bluff or terrace which overlooks the town of Canyon Creek. Canyon Creek itself is situated along the Alaska Highway at mile 998. The site is large even though it has been partially destroyed on its southern edges by the Alaska highway, by gravel pits just back from the bluff on its west side, by grave houses and by telephone and telegraph installations on its eastern end (Fig. 72A).

It was first visited by F. Johnson in 1944. Later he made surface collections and then cut a trench through in 1948. Leechman, in 1946, visited the site and made surface collections. In 1957 I arrived and cleaned off a bank which revealed a series of superimposed floors, or

Fig. 72. Canyon Creek site: A. View looking west (photo by H. M. R. June 5, 1948); B. Profile of main excavation showing superimposed "floors" on turf layers that were occupied.


A


B

turf layers, and then in 1959 I further tested the site and dug one major trench in it. The whole top of the bluff is composed of sandy soil and bare parts are littered with bone, chips, and artifacts. As well, various cuts through it revealed from three to eleven superimposed dark turf layers nicely separated by sterile sands below a volcanic ash layer. These features usually indicate great archaeological potential -- as it turned out this was a fraud and a delusion!

In our excavation, we again laid out a grid along the cardinal axes and put in a series of seven tests along an east-west axis. Most of the squares had a series of old humus or turf levels, each separated by sterile sands, down to a depth of four to five feet. In the notes these turf layers or ancient surfaces were referred to as floors, but since they were not actually made by man's occupance they are not such in the true sense of the word. However, to remain consistent with our notes I shall continue to call them floors but shall place the word in quotation marks to indicate that I know better. The "floors," usually containing one or two chips, a piece of charcoal or two, and sometimes as many as six pieces of bone, were carefully removed by trowel while the intervening sand was shoveled out. The number of so-called floors in each of the tests differed and it was impossible to correlate the turf layers of one test with those of the next. This, however, was not too crucial as only one side scraper, and one hammerstone was found in the eight hundred cubic feet excavated.

The scarcity of artifacts, moreover, did nothing for morale -- especially since the tests were dug in a steady sandstorm that blew the dirt piles back into our trenches and into our faces, blew up and down and around the walls, not helping our eyesight, and even occasionally formed neat little whirlwinds that took notes, bag labels, specimen bags, floor labels, and the contour map (which I never finished) and distributed them randomly over the surrounding landscape.

Just for the record let me mention something about each of the test squares. Test eleven occurred in square N170W35 and contained a dark turf layer at the nine inch level, volcanic ash at fourteen inches and a turf layer with bone at seventeen inches and another "floor" at forty-two inches with a chip. Test twelve was at S5W30, had a "floor" at twelve inches, volcanic ash at thirteen inches, a "floor" with charcoal and burned bone at thirty-seven inches, a "floor" at forty-three inches, patches of a burned "floor" at fifty inches, a "floor" with four chips at fifty-seven inches and a "floor" at sixty-one inches with charcoal. Test thirteen was in square E15, contained a "floor" at seven inches with bone, a "floor" at eleven inches with bone and chips, volcanic ash at thirteen inches, a "floor" at eighteen inches, a "floor" with chips at twenty-four inches, a "floor" with chips at twenty-four to twenty-seven inches, a "floor" at thirty inches, a "floor" at forty inches, and a "floor" with chips at fifty-four inches. Test fourteen occurred at S5W80. It contained a "floor" at eleven inches and volcanic ash at twelve inches, at thirty-two inches was a burned "floor" and two specks of bone, at thirty-eight inches

a burned "floor," at fifty-four inches a patch of burned "floor," at sixty inches a charcoal "floor" with chips and one flake side scraper, and at seventy-one inches a reddish layer that was, perhaps, a "floor." Test fifteen was in square S5E75. A "floor" of reddish soil appeared at nine inches and eleven inches over volcanic ash at thirteen inches. Then at twenty-four inches, at thirty-three inches, at forty-two inches, at fifty-five inches, sixty inches, and sixty-eight inches were other so-called floors. The ones at thirty-three inches and sixty inches contained burned bone. Test sixteen at E120 had a "floor" at eleven inches, volcanic ash at eighteen inches, a "floor" at twenty-four inches which contained burned bone, chips, and a hammerstone. There were also turf layers at thirty-six inches, forty-three inches, and sixty-one inches. Test fourteen was at E165 and had "floors" at eleven inches, eighteen inches, twenty-seven inches, thirty-eight inches, and fifty-three inches, while Test eighteen at S5E215 had "floors" at eleven inches, eighteen inches, thirty inches, and forty-nine inches.

The other test at S25E30 was a continuation of our 1957 bank cleaning. This was expanded into our main trench. Using the vertical profile of the bank as a guide, we dug into S25E25. When these two were dug we had a ten foot profile from S20E20 to S20E30 as well as one from S20E30 to S25E30. A profile was then drawn, the various "floors" numbered and a "floor" label was stuck into the floor itself with a nail. Next, we started to dig into square S25E35 from the E30 and S25 profiles. We excavated from the vertical face, first removing the humus by trowel, then the underlying sand by shovel, then the first "floor" by trowel, then the underlying sand by shovel, the second "floor" by trowel, etc., until the final "floor 10" had been removed by trowel at a depth of about six feet. The new profile was then drawn, the "floor" labels replaced in the new square and then we excavated S25E40 by the same technique and then later, S25E45.

This then gave us a long profile from E45 to E20 along the S20 axis. The profile was sketched, we marked the "floors" with a trowel, and relabelled them with label pins. We, also, attempted to photograph the profile but, as I found out later, our ever present sand kept the shutter from closing completely. Using the same technique, we next removed square S20E45, S20E35, and S20E25. Later, S20E30 and S20E40 were excavated giving us another long profile which was duly recorded along the S15 axis. Finally, three squares S15E40, S15E35, and S15E30 were dug.

In this main trench excavation there were eleven superimposed turf layers (Fig. 72B; 73). While each one produced some chips and bone, artifacts were not numerous nor did each "floor" extend over the whole excavated area. "Floor" eleven extended over only about half of the excavated area and contained but a few chips, a little bone and one thin flake side scraper. The most that one can say is that "floor" eleven showed evidence of human occupation.

"Floor" ten, at a depth of about seventy-six inches was fairly prominent throughout the main trench, although the floor was broken and patchy

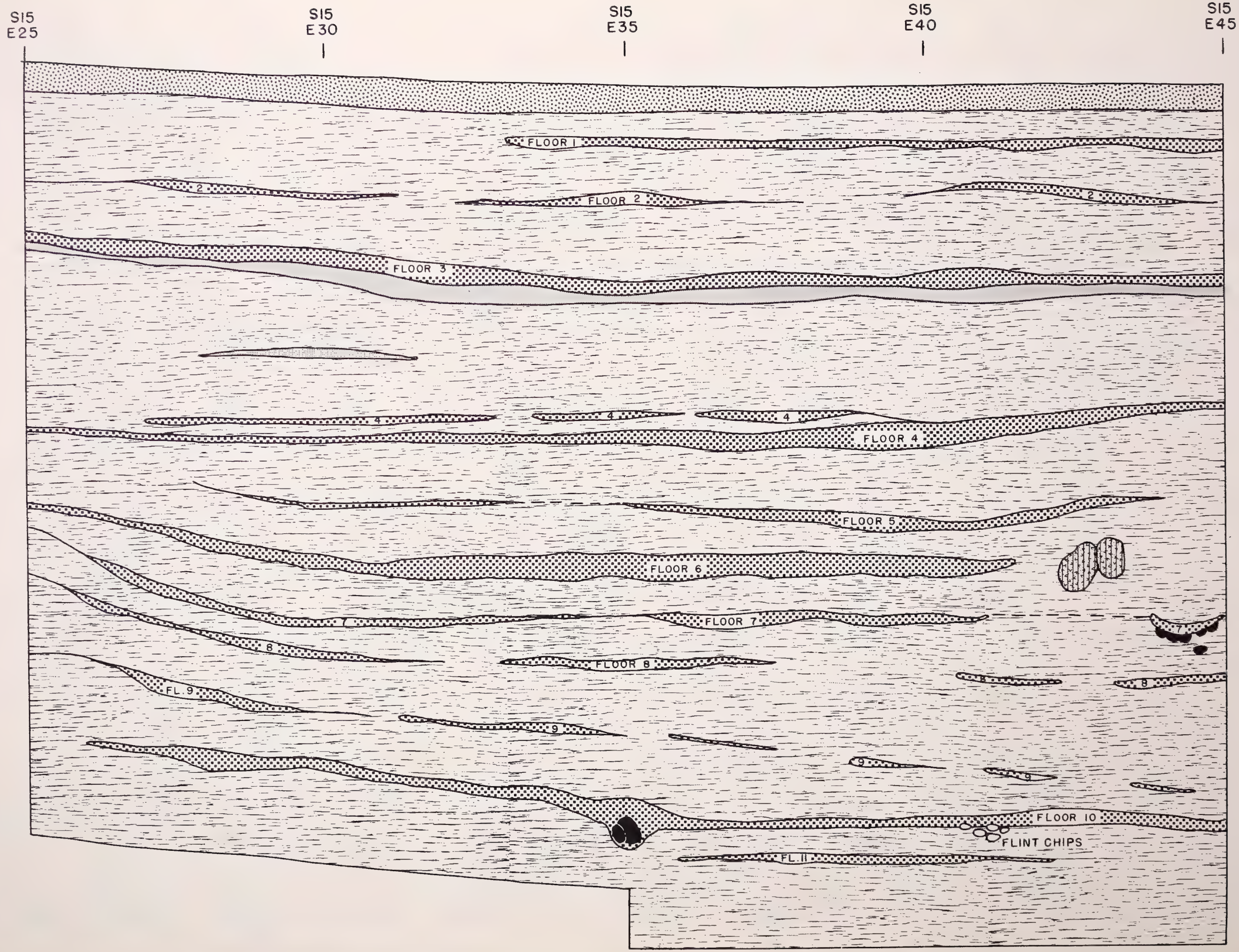
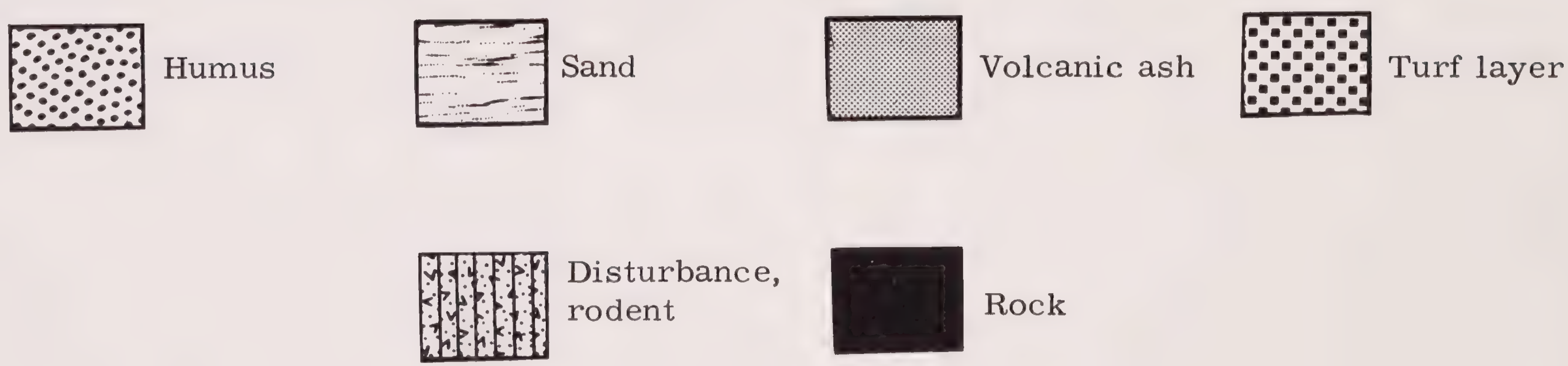

S15 E25
S15 E30
S15 E35
S15 E40
S15 E45
FLOOR 1
FLOOR 2
FLOOR 3
FLOOR 4
FLOOR 5
FLOOR 6
FLOOR 7
FLOOR 8
FL. 9
FLOOR 10
FLINT CHIPS
FL. 11

Fig. 73. Canyon Creek site. Profile of the main trench. Vertical scale is double horizontal.



in the northern three squares, and chips and bone less prevalent. The same stratum may have occurred in the test trenches but here it showed no evidence of intensive occupation. Therefore, I believe it is safe to conclude that the ten artifacts found on the "floor" were laid down by a small group. Buffalo, moose, caribou, and small carnivore bones indicate that one of their activities during this brief stay was hunting. The projectile points further confirm this conclusion. A net sinker indicates that the people probably did some fishing. This fact plus some bird bones hint that this small group may have stayed at the site in the summer. The end scrapers, side scrapers, blades, and bifaces show that skins were worked. Evidence of food preparation is apparent by the cracked buffalo bones found as well as by bones showing interior scraping done perhaps to remove the marrow. In addition, a small rock-filled hearth-like area in square seven, contained burned bone. In square S25E40 there was a large number of chips pointing to the fact that these people were manufacturing chipped stone artifacts during their summer sojourn.

Only twenty-two artifacts occurred in "floor" ten and so it is difficult to classify this component. The prevalence of blades over microblades, the flat-topped end scrapers, the Whitehorse point and Anderson point would seem to indicate it belonged to a very early part of the Taye Lake phase, but more evidence is needed. At best, it is only a possible component.

"Floor" nine, at about seventy-two inches, encompassed about the same area as "floor" ten. Artifacts were relatively scarce although there were more chips. Bones included those of a caribou, rabbit, and possibly moose. Some of the cultural implications of "floor" nine materials are similar to those in the so-called floor ten but were based on more limited materials. Exact classification is difficult with such a small sample.

"Floor" eight at roughly sixty inches, was smaller in extent and had even fewer artifacts. Those found were a blade and a side scraper which were excavated along with fragments of moose and a beaver jaw. Little can be said about these meagre findings.

"Floor" seven, at fifty-two inches, was more pronounced in the southern half of our excavation and almost absent to the north. Eleven artifacts were found along with a few chips and fragments of unidentifiable bone. A hammerstone, a chi-tho, three bifaces, three side scrapers, a fibula awl, a point tip, and an end scraper occurred. They are too generalized to permit definite classification.

"Floor" six, at forty-eight inches was well defined in the eastern three-quarters of our trench and may have extended into test fifteen. Again it looks like an occupation by a small group for a short time. To belabor the obvious again the buffalo and moose bones and four spear points indicate hunting; four end scrapers, six side scrapers, three bifaces, three blades, and three microblades may indicate working of skins or butchering, while the numerous chips may mean manufacturing. The Refugio, Morhiss and Agate Basin points, chi-thos, blades and micro-

blades and crude plano-convex end scrapers, allow us tentatively to classify "floor" six as a probable Taye Lake component.

The turf layer that was called "floor" five, at thirty-seven inches was confined to the middle of our trench and contained only eight artifacts, and fragments of rodent and moose bones. The Anderson and Refugio points, blade and chi-tho suggest a Taye Lake component.

"Floor" four, at thirty-two inches was not well defined and sometimes was separated or divided into two or three floors. This ill-defined "floor" contained fourteen artifacts, moose bones, a porcupine jaw, and bird bones. "Floor" four might have been a short summer occupation by a small group.

Above "floor" four, at about eighteen inches was the volcanic ash. After considerable study of the meagre remains from "floors" four to eleven a few facts become apparent. Most of the occupations were short-term, often in the summer and by small groups. The position of the site on a high, uncomfortable ridge which may have been a game trail, as well as the bones and some of the artifacts, suggest they were primarily hunting camps. Exactly who they were is difficult to determine, however, "floors" ten, six, and five do seem to have a small series of artifacts characteristic of the Taye Lake horizon. Because of this I have tentatively classified all these seven occupations as possibly being Taye Lake and in the charts of artifact types have lumped these materials together. The earliest "floor" eleven could either be an early Taye Lake or late Gladstone occupation.

The three occupations above the volcanic ash contained even fewer materials and are even more difficult to interpret and classify. "Floor" three at seventeen inches, contained a hammerstone, two thumbnail end scrapers, a flat-topped end scraper, a chi-tho, and two side scrapers while "floor" 1, at the base of the humus, contained five side scrapers and a biface. Also, a tourist visiting our site found a large corner-notched point with a concave base eroding out from just under the humus which he promptly pocketed. For these reasons I have tentatively classified the upper three occupations as belonging to the Aishihik horizon.

Summary. All in all, the excavation of JfVg-1 was not a great success and all conclusions must be considered tentative. There is the possibility that a series of seven Taye Lake possible or probable components were located under three Aishihik floors. Perhaps in the future some archaeologist with a skin and eyes more impervious to sand, will further excavate this site. Perhaps then it may be better interpreted and the cultural placement of the occupations more securely classified. I wish him lots of luck.

The Taye Lake Site JfVb-4

This ancient camp was located at the southeast end of Taye Lake about one-half mile from the open water of the lake and about one hundred yards north of Mendenhall Creek (Fig. 78). The horse trail around the south side of the lake goes across the northern end of the site, which is situated on the first terraces above swampy ground. Some of the occupied area is on the first or thirteen foot terrace which rises sharply out of this swamp. The terrace itself is V-shaped, running north-northeast to south-southwest roughly parallel to Cranberry Creek and approximately parallel to Mendenhall Creek to the south which is oriented east and west. The northern part of the site above the terrace front is relatively level and its width varies from one hundred feet in the east, to two hundred feet in the west. A few long, low ridges, one to two feet high run across it parallel to the terrace face. These ridges may have been wave-formed beaches. Back of these ridges is another eight foot step leading to the second terrace, which is even flatter on top. In the northeast corner of the site, this second terrace descends directly to the swamp without an intervening first terrace. Thick vegetation and trees cover the swamp and spruces cover the upper terrace. The lower terrace is covered mainly with grass and occasional spruces (Fig. 75).

The Geological Survey under the direction of E. D. Kindle had a base camp on the site in 1946 and he gave the Museum a collection of artifacts from the site. In 1957, M. Molot, R. Hamel, and I visited the site, gave it a number and collected more material. In 1959, from August 10th to 17th, five of us returned to the site for excavation.

To excavate, we first put in ten five foot test squares to determine the extent of the site, and to locate the area which would yield the greatest number of artifacts in the shortest possible time. These test squares were tied together in a grid system along the cardinal co-ordinates and numbered accordingly. Later the map of the site and of the test squares was drawn (Fig. 74).

On the lower terrace, we dug five of the test squares and I supplemented the testing by soil-stripping three small areas. Test 1 was made in square S50 at the south edge of the lower terrace. Its stratigraphy was fairly typical of the site (Fig. 75). The top stratum, called Zone A, was composed of humus about three inches thick. In the lower part of the humus designated Zone B were patches of ash, burned bones, chips, and a few artifacts. This overlaid Zone C which was a stratum of culturally sterile volcanic ash about one-half inch thick. Below this was Zone D, a reddish clayey sand containing more chips and artifacts, an occasional fire-cracked rock, a piece of burned bone, and a piece of burned caribou antler. Underneath these remains were sterile, yellowish beach sands over heavier gravel.

Test three was made in square E50 at the east edge of the lower terrace. It contained nothing in the upper humus, but in the top two inches of Zone D, the red soil, there was a pavement-like layer of chips

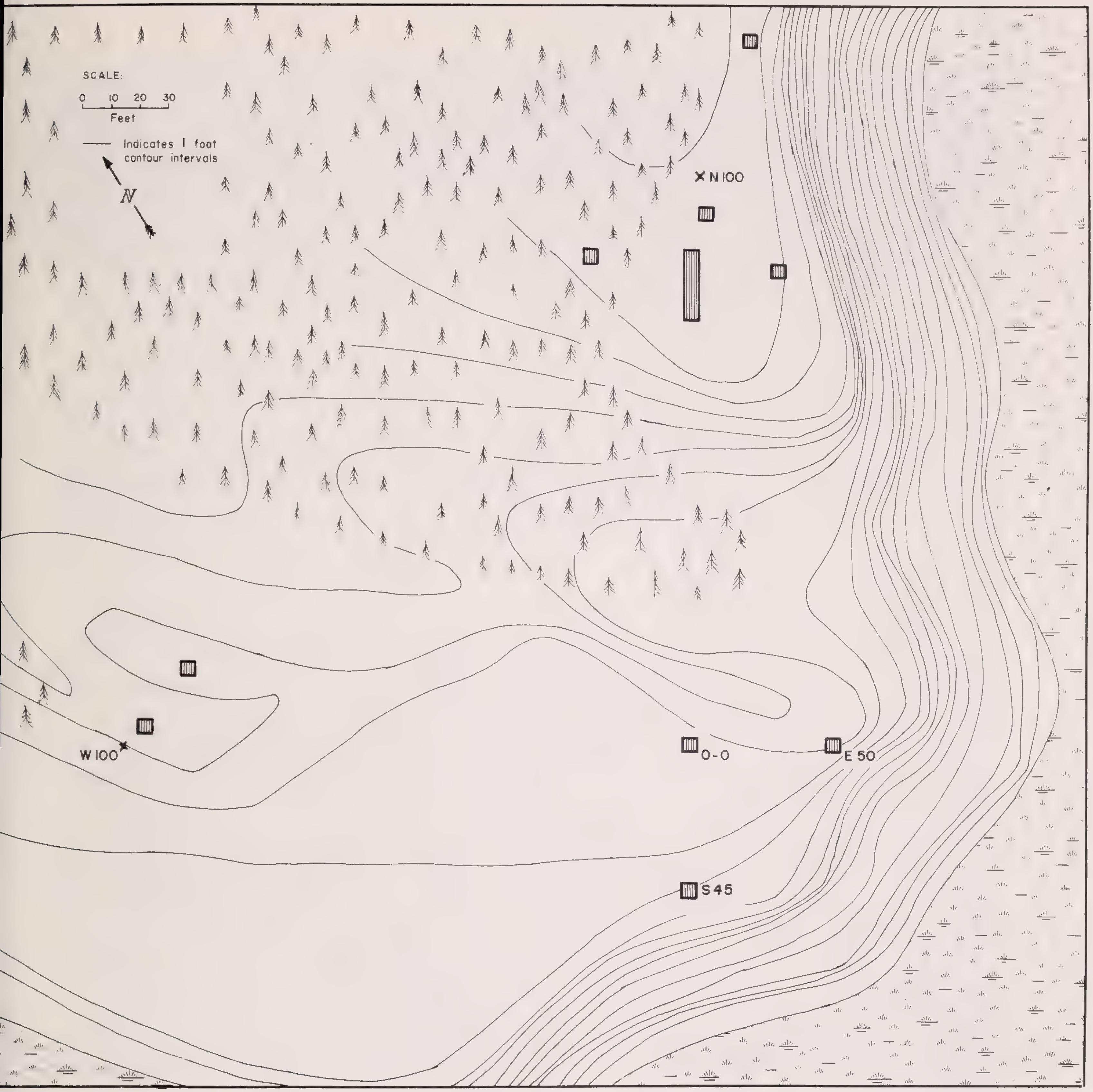


Fig. 74. Contour map of the Taye Lake site with area of excavation indicated.

containing some artifacts. Test five was in square 0-0. Although it contained a few chips and artifacts in Zone D, it was not very productive nor did it have any great concentration of chips. Tests six and seven in squares N5W190 and N25W175, respectively, were even poorer, with no chips in Zone B and only two or three in Zone D. These squares seem to have been north and west of the main area of occupation. Three less formal tests made by laying back the top soil with a shovel yielded one flint chip at S80W190, while another at S110W100 yielded only about twenty chips and no artifacts in Zone D. The third informal test at N50 was about like test five.

Another test, made during the last few hours at the site when our time was running out was undertaken with a shovel below the terrace at S100. It was most interesting. Zone A the humus contained a few chips, and ash of Zone B appeared at its base. These in turn overlay grey clays. Both the red soils and volcanic ash were absent. This appears to show that Taye Lake extended up to the lower terrace when the volcanic ash was deposited and when man lived on top of Zone D. Further, the lake seems to have retreated to near its present position by the time of the occupation in Zone B.

While these tests were going on, five more were being undertaken on the higher terrace. Test eight was made in square N245E20. It contained four chips in Zone B and about forty artifacts, twenty-six of which were prismatic blades, and chips in Zone D. A soil-stripping test at N300E40, however, yielded only a couple of chips and indicated that test eight was near the northern limit of our area of occupation in Zone D. Test nine, back in the trees, in square N170W35, was about the same as test eight, though a few artifacts occurred in Zone B, but again soil stripping at N170W50 revealed we were near the western edge of the area of cultural concentration on the high terrace. The other three tests, test two in N185E5, test four in N165E30, and test ten in N150, situated in a limited area on the southeast portion of the high terrace, were archaeologically much richer than any previously described. In each of them Zone B contained definite traces of ash and burned bone along with a number of artifacts, while Zone D contained a pavement-like layer of flint chips and artifacts, as well as burned patches, ash and fire-cracked rock.

Because of more definite evidence of stratigraphy, plus a larger sample of artifacts, the last two days at the site were occupied by digging a trench from test ten towards test two, in squares N155, N160, N165, and N170. In this trench, a definite bed of ashes six feet in diameter and with a maximum thickness of four inches was found in Zone B. In square N170 there was a small circular hearth fourteen inches in diameter, filled with fire-cracked rock, and at N162W3 there was a shallow conical refuse or storage pit which was about twenty-six inches in diameter having a maximum depth of nine inches. Also found in Zone B were small triangular points, chi-thos, glass beads, thumbnail end scrapers, side scrapers, bird and large mammal bones, and a few bifaces.

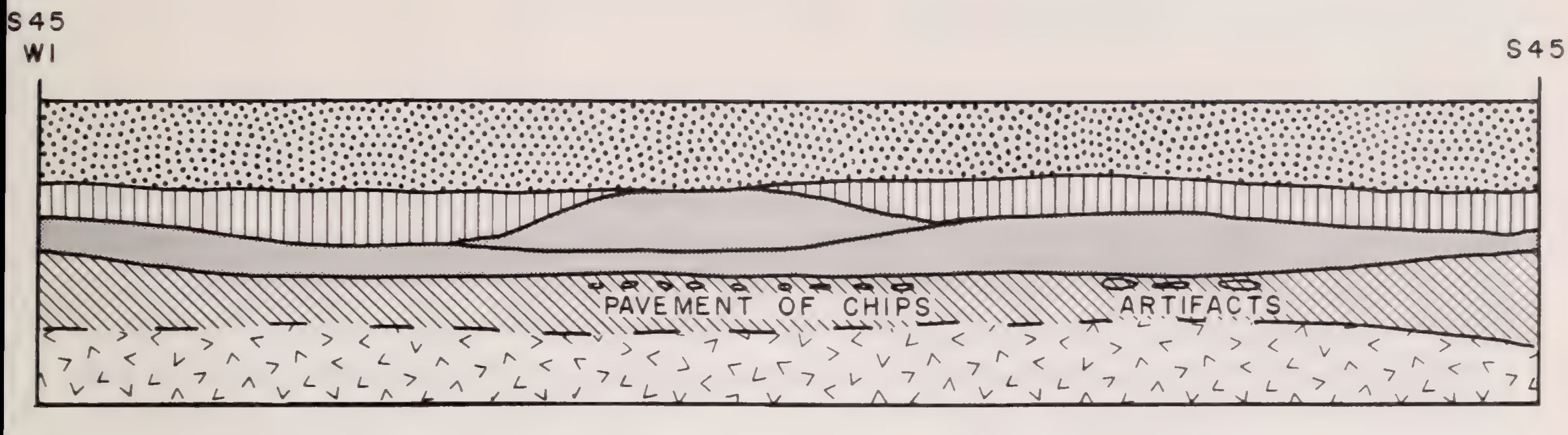
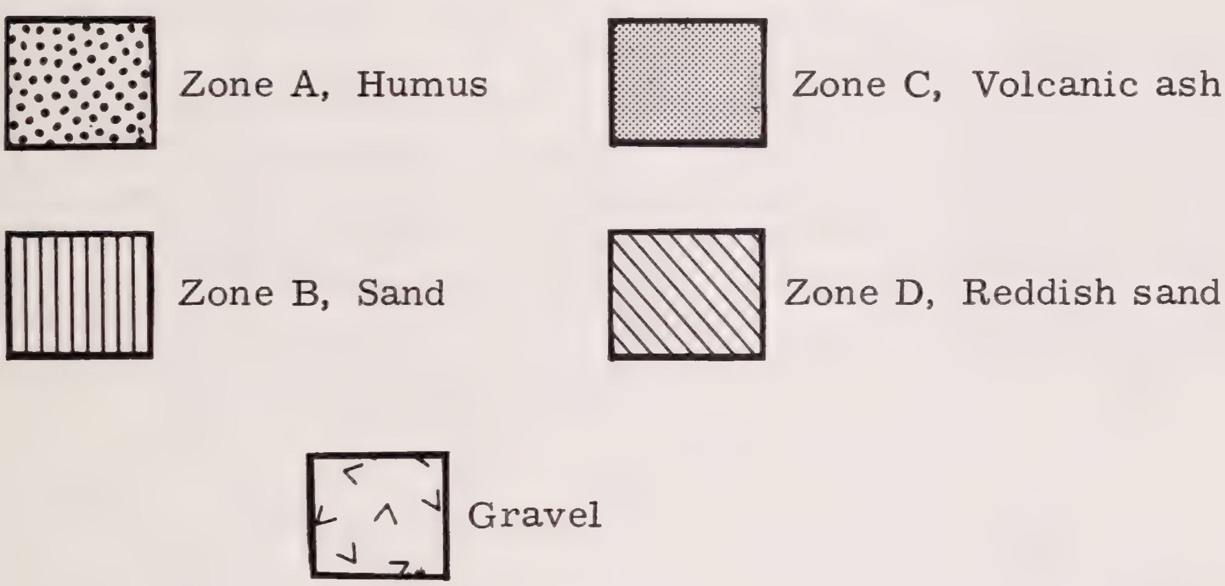


Fig. 75. Taye Lake site. Profile of test 1, west to east on S45 line. Reddish brown sand is not Kluane silt as far as known. Vertical scale is double horizontal.



Underneath these remains was the thin layer of volcanic ash and then a small four inch layer of red, sandy soil which just barely covered a two inch layer composed of artifacts, chips, hammerstones, and fire-cracked rock. Under this occupation layer was more reddish soil which gradually faded into the yellowish sands below it. The artifacts of this layer were mainly heavy bifaces and unifaces, but there were as well some end scrapers, blades, and large projectile points. In spite of the evidence of burning provided by the fire-cracked rock very few burned bones or charcoal were found.

Summary. From the previous description it is apparent that at the Taye Lake site there was cultural stratigraphy. The Bennett Lake complex in Zone B was superimposed on the Taye Lake complex in Zone D. Let us now examine more closely these two occupations.

Chips and artifacts in Zone D were concentrated over a huge V-shaped area along the eastern and southern edges of both the high and low terraces. Generally speaking, they seem to be most numerous in the area from the edge of the bank to not more than eighty feet back from it. They extended along the east edge for three hundred feet, and along the south edge of the terrace for one hundred and fifty feet. A rough estimate reveals that the chips and artifacts covered a total area of about thirty thousand square feet. The relative thinness of the artifact zone leads one to guess that the occupation or perhaps group or succession of adjacent occupations were not of long duration.

When were the people living at the site? To this question we cannot give a definite answer, but some evidence permits speculation. The caribou antler only could have been present in winter. The numerous patches of burned earth lacking fire-cracked rock, usually identified with cooking, seem to hint that the fireplaces were built for warmth in winter. The lack of bird bones from birds usually killed only in summer and the lack of net sinkers would have most likely been used in the adjacent lake during the summer months somewhat confirm this hypothesis.

It is perhaps significant that many of the sites of the Taye Lake cultural phase are of similar size to Zone D. Two possible explanations seem worth mentioning and these differentiate Taye Lake from other cultures which came before or followed. One, that the Taye Lake phase exemplified by the first occupation of the Taye Lake site represents a population maximum in which large groups or a band lived together during certain seasons. The other possibility is that during this period small groups moving on some seasonal cycle came back to the same places. It is possible that they had some idea of band territoriality. This problem of band or group size is an important one and it is unfortunate that the excavation of JfVb-4 did not give us more evidence contributing to its solution. My personal guess is that JfVb-4 which covers a large area represents the winter camp ground of a large group.

What were the group's activities during this occupation or occupations? The tremendous amount of chips, the partially completed artifacts and the bifacial tools, which could have been cache blades, seem to

indicate that one important activity was flint knapping. In other words, JfVb-4 was in part a work shop. The large proportion of end scrapers, side scrapers and knives also seem to show that the manufacture of leather or skin clothing took up a considerable amount of their time. The projectile points and skinning knives, plus the burned large mammal bones indicate that hunting was an important activity. The people were undoubtedly engaged in other activities but our archaeological evidence does not clearly reveal them.

Comparison of the five hundred and nine artifacts from this horizon, that is Zone D, with other components, results in classifying it as a pure component of the Taye Lake phase. It contained such diagnostic traits as a large number of prismatic blades and few microblades, large proportions of bifacial choppers and large scrapers, often with retouching along two edges, squarebased bifacial knives, spokeshaves, notched end scrapers, crude plano-convex end scrapers and flat-topped teardrop-shaped end scrapers and Refugio, Whitehorse, Lockhart, Taye Lake, Anderson, Morhiss and Destruction point types.

The later occupation in Zone B was very much more limited, at the most it was by two or three families. The bird bones and fish scales indicate that it was occupied during the summer and the thinness of the deposit indicates that the stay was brief. Activities also were more limited. The mammal bones and arrow points indicate some hunting and the fish bones, fishing. Some of the rabbit bones may indicate trapping. The flint knives may have been used to cut up the game. Pits having charcoal at the bottom and fire-cracked rock above may well have been used in roasting meat. End scrapers and chi-thos indicate that some preparation of leather was undertaken. Other activities are more difficult to discern.

The chi-thos, thumbnail end scrapers, and small arrow points allow us to classify this component in the Bennett Lake phase. The glass beads indicate it belongs in the historic period.

PROBABLE COMPONENTS FOUND IN THE ARCHAEOLOGICAL RECONNAISSANCE AND TEST EXCAVATION

Probable Champagne Components

JeVc-3. This site was located on the northern edge of the sand dunes at Champagne (Fig. 76). It is about two hundred yards south of the Alcan highway directly behind the westernmost house. Most of the artifacts appeared on the surface of a dish-shaped blowout. A dark, thin humus layer was located about two feet below the volcanic ash layer. Since this looked like a good occupation level we dug the site for three days, and it was most discouraging because only one artifact was found with the chips and bones. The artifacts seem to belong to the Champagne phase and it may be assumed that the lower humus excavated represented a small component of this phase before it was destroyed in the wind. Artifacts included two Agate Basin, two Milnesand and four tips of projectile points, one flat-topped end scraper, one biface fragment, one biface chopper, and six side scrapers.

KfVe-1. This site was northwest of the Pelly Farm (Figs. 62; 76). It was on the high terrace just west of the stream and west of KfVd-1 and KfVd-2. Most of the artifacts were lying on the surface, but cleaning a profile revealed a single burned floor about one foot below. This produced a great deal of burned bone and a split pebble chopper. Because of this we suspect that all artifacts originally came from this floor. The artifacts consist of a Ford Liard burin, two Agate Basin points, a point tip, two split pebble choppers, a pebble chopper and a side scraper. This limited congeries may be classified in the Champagne phase.

Pure and Probable Little Arm Components

JeVi-1. This site was found by F. Johnson on the north side of the Alaska highway at mile 1013 (now 1011.9) (Fig. 77). Subsequent widening of the highway has almost completely destroyed the site. In the lower part of the reddish silty sands underneath the volcanic ash we collected a few artifacts and chips. The Lerma and Milnesand points, one ovoid plano-convex and flat-topped end scraper, six side scrapers, the eight microblades and two tongue-shaped cores which Johnson found allow one to classify the site tentatively as a Little Arm component. Johnson and Raup have located this site on the beach of a lake they designate as Lake Number three in the Dezadeash and tributary valleys (Fig. 6).

JiVs-2. This site is located on the east side of Kluane Lake on a point that marks the beginning of the Little Arm (Fig. 77). It is on the next point north of JiVs-1 and on the same terrace. It was tested in 1944 by F. Johnson. In the lower part of the reddish brown soils he found a

number of tools which are classified in the Little Arm phase. He describes his excavations and findings more extensively in this volume but I have taken the liberty of including his artifacts as well as the few we collected on its surface in this report. Artifacts included an Agate Basin and a Milnesand point, one blade, nine microblades, one tongue-shaped core, a burin, five end scrapers, twelve side scrapers, and seven bifaces.

KkVa-2. Dr. D. Leechman found this site in 1947 on the 30 foot high terrace at the northwest end of Minto Lake, just west of the mouth of Minto Creek (Fig. 77). At that time he dug a small test at the edge of the bank in front of Gillespie and Hare's cabin. A tongue-shaped polyhedral core was uncovered.

Our party returned to the site in 1957. After an hour of fruitless searching for artifacts in the bare spots around the cabins, as an experiment, we turned over the soil in front of the easternmost cabin. In a reddish soil under the humus we found about ten microblades and a fragment of a projectile point. Four of us then dug in different directions, like so many gophers, and before the excitement had died down we had a large, irregularly shaped excavation. Though we made no horizontal measurements on any of the artifacts they all came from the lower two inches of the reddish soil about eight to eleven inches below the surface. There seemed to be little doubt that we were dealing with a single occupation and further "testing" revealed the chips extended over a region roughly thirty feet wide and forty feet long.

In spite of our short time at the site and the haphazard method of excavation we uncovered a large number of artifacts. These included two tongue-shaped polyhedral cores, four blades, forty-three microblades, two burins made on artifacts, an unworked primary and a secondary burin spall, ten side scrapers, seven bifaces, five end scrapers, an Agate Basin point, a fragment of Milnesand-like point, and a Minto point. Also found were a few fragments of burned bone and one possible piece of caribou antler suggesting a winter occupation. All the above materials may be readily classified as Little Arm.

LaVk-2. This is a very rich site on the south side of Moosehide village along the Yukon River just below Dawson City (Fig. 77). The site is on the second or sixty foot river terrace at the junction of the Yukon River and Moosehide Creek. The area of the occupation is about seventy feet long and twenty-five feet wide. It is located on the point made by the erosion of the terrace by the north edge of Moosehide Creek. In 1957 we had found artifacts in the path along the west edge of the top of the terrace. In 1960 we excavated a seventy foot long and five foot wide trench parallel to the path's east side. The excavations were done by trowel. The cultural deposits, were never more than one foot deep. The top three to six inches were of humus and did contain some burned bone, fire-cracked rock and a few flint chips. Underneath these remains was a pink soil from two to eight inches thick. Throughout this stratum, at no uniform depth, were a large number of artifacts which are typical Little Arm tools.

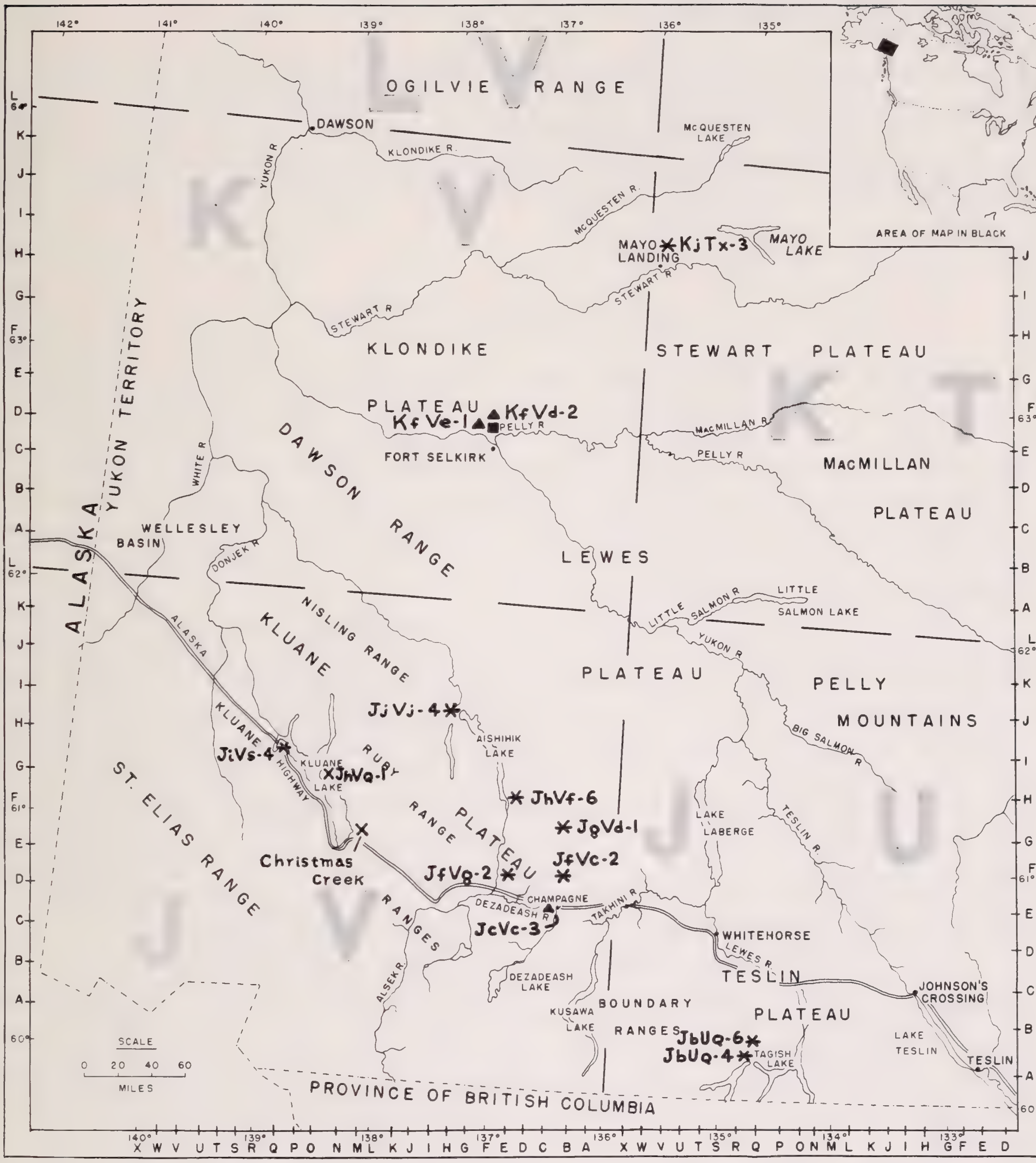


Fig. 76. Distribution of Kluane and Champagne components

Kluane components

Possible

Champagne components

Pure

Probable

Possible

These included an artifact burin, two Fort Liard burins, a pointed flake drill, a tongue-shaped polyhedral core and two conical cores, thirty-nine blades, one hundred eleven microblades, forty-three side scrapers, twelve bifaces (mainly split pebble choppers) twenty-two end scrapers, an Agate Basin, two Milnesand and two Plainview points, and one net sinker.

Probable Gladstone Components

JeVc-1. This manifestation was cut through by the Alaska highway. It is on top of the hill just east of Champagne near mile post 974. 1 (Fig. 77). The artifacts were picked up on the eroding sand. The few tools found in situ came from under the volcanic ash. They included a Fort Liard and an Anaktuvuk-type burin, four point tips, one Milnesand and one Morhiss point, three blades and five microblades, and three side scrapers. This assemblage suggests that it may have been an occupation belonging to the Gladstone phase.

JfVg-3. The ancient camp was about one hundred yards north of the Alaska highway at Mile 996 and about twenty-five yards south of Canyon Creek on a high terrace (Fig. 77). Originally, Johnson and Leechman collected extensively on it, but we were very unsuccessful in our surface hunting because of highway construction. Artifacts that I was able to examine, mainly in Johnson and Leechman's collections, included twenty-two blades and microblades, a conical and polyhedral core, an end-of-blade scraper, a round plano-convex scraper and a flat teardrop-shaped scraper, two point tips, a Lockhart point, an Agate Basin, a Milnesand and a Besant point, eleven side scrapers, three biface, and an abrader. This assemblage suggests it belonged to the Gladstone Phase.

JfVp-1. This site was located on the edge of a high terrace of a stream entering Kluane Lake from the southwest next to the mile marker 1073 (Johnson's site 1074) on the Alaska highway. (Fig. 77). It was a large site, probably with a number of components. Johnson, Leechman and I collected on it. Johnson collected seventeen side scrapers, six end scrapers, three Agate Basin points, one Milnesand point, and some bifaces.

In 1960 we tested the site and noted an interesting phenomenon. At the edge of the bank we found a series of dark reddish layers separated by sterile sand down to a depth of about four feet. All of the seven layers (under the volcanic ash) produced some chips or bones. However, as we extended our trench northward away from the bank these reddish lenses coalesced to form a one-foot layer of reddish soils. Thus, I suspect that the surface collection probably represents materials from a number of different components. The stratigraphic situation and its implications have been discussed by Johnson.

Since the area of lenses was unproductive digging, we decided to test an area forty-five feet back from the bank where there was only one

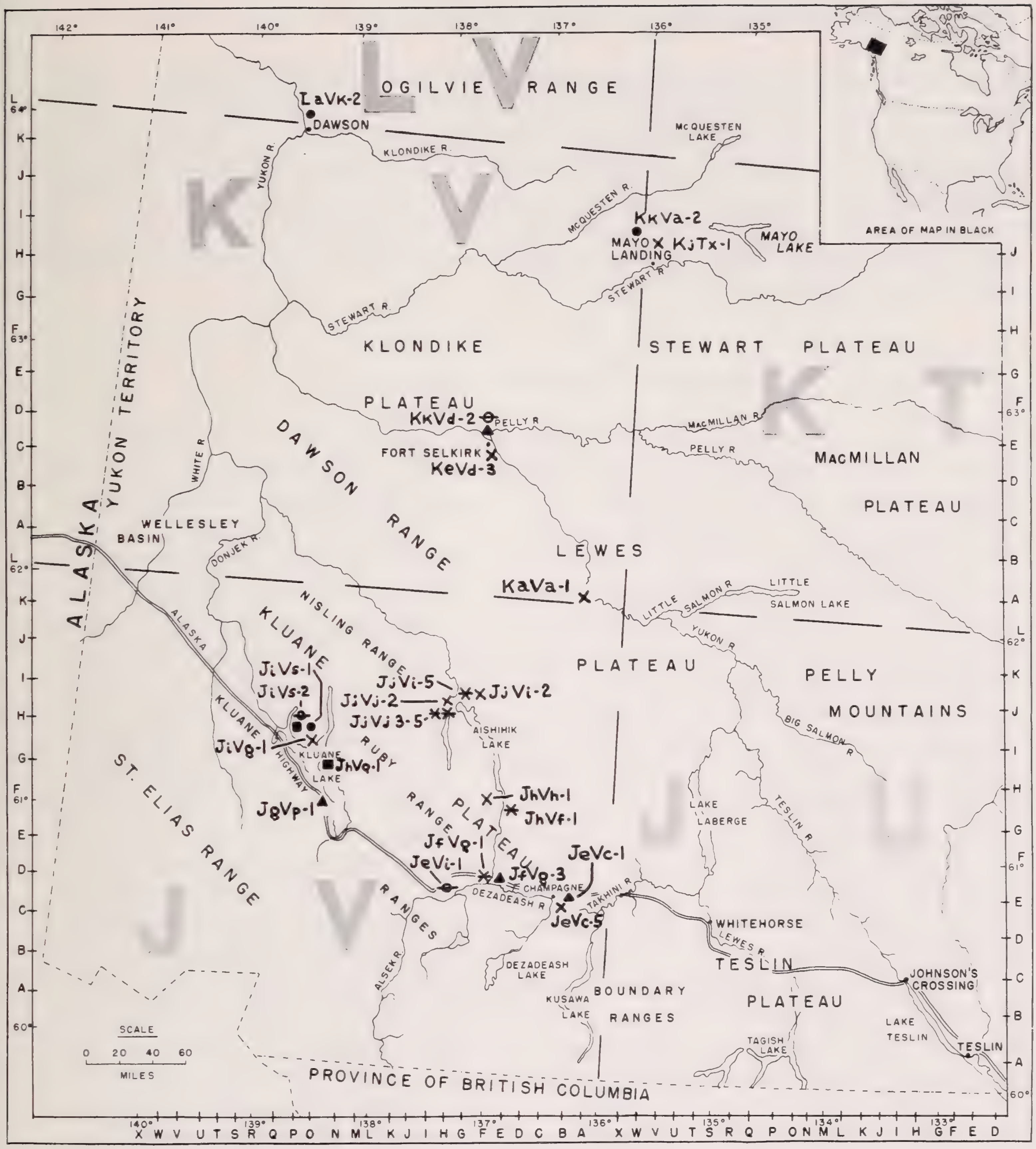


Fig. 77. Distribution of Little Arm and Gladstone components.

Little Arm components	Gladstone components
Pure	Pure
Probable	Probable
Possible	Possible

thick layer of dark reddish soil. This test was T-shaped, being twenty-five feet long and five feet wide, except at the south end where we dug two five foot squares on either side of the main trench. In the trench just under the volcanic soils in the upper two or three inches of the dark reddish soils we found a Taye Lake point, four blades, five microblades, one spokeshave, one end-of-blade scraper, three flake end scrapers, two flat-topped end scrapers, and eight side scrapers. This suggests a Gladstone occupation.

Probable Taye Lake Components

JeVc-2. Archaeological material was eroding out of the sand dune about one-half mile south of the highway at Champagne (Fig. 78). It was along the edge of the river where the present inhabitants of Champagne draw their water. Johnson excavated on or near this locus and both he and I collected some materials from the surface in an area about eighty feet in diameter. It would seem that the artifacts as well as fire-cracked rock and burned bone came from under the volcanic ash in sands. (Johnson discusses this site in detail.) A large number of artifacts were collected. They included an artifact burin, a flake end scraper, a chi-tho, a round plano-convex end scraper, three flat-topped end scrapers, three bifacial choppers, a fragment of a biface, five point tips, an Anderson, a Besant and a Whitehorse point, seventeen side scrapers, a spokeshave, and twelve blades. Although it is not an excavated site, it very probably represents a component of the Taye Lake phase.

JeVc-4. This site was in sand dunes directly south of Champagne along the edge of the road and the bluffs (Fig. 78). It seems to cover about one-half an acre. The material was eroding out of the sand under the volcanic ash. Artifacts include: one Plainview, one Milnesand, two Morhiss, and one Whitehorse point, a point tip, ten bifaces, nineteen blades, four microblades, twenty-two side scrapers, three spokeshaves, and four end scrapers. The assemblage indicates that it probably was a component of the Taye Lake phase.

JfVb-1. Artifacts were found on sandy slopes twenty-five yards to the east of the trail from Champagne to Taye Lake where it leaves the low flats and goes on to an esker. This spot is about four miles south of Taye Lake (Fig. 78). Artifacts occurred on and in the sands just under the volcanic ash in an area twenty-five feet in diameter. The majority were found upon troweling off the sand and ash. Artifacts included: two blades, eight side scrapers, two square-based bifaces, one ovoid biface, six biface fragments, five biface choppers, one chi-tho, one flat-topped end scraper, and three crude plano-convex end scrapers. It probably was a Taye Lake component.

JfVb-5. This ancient habitation was situated on a high terrace around a cabin just south of the stream at the east end of Taye Lake (Fig. 78). Most of the area, about two hundred yards in diameter, and even the sod

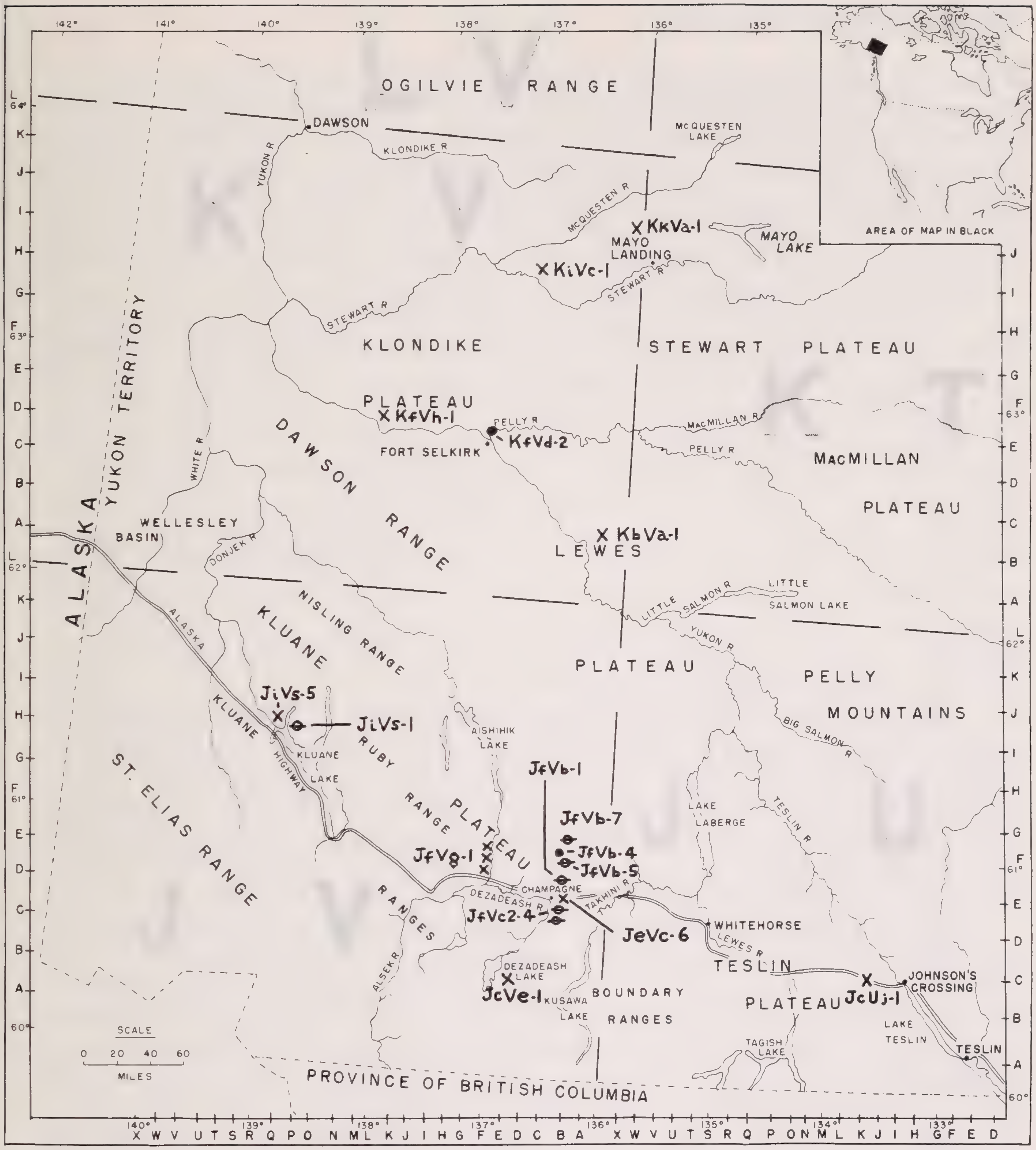


Fig. 78. Distribution of Taye Lake components.

Pure — Probable — Possible

on the roof of the house was littered with chips and artifacts. A test excavation in an undisturbed area revealed chips and a biface just under the volcanic ash overlying terrace gravel and sands. It seems probable that all the materials once came from this stratum. Artifacts included: a Lockhart point, nine blades, fourteen side scrapers, one spokeshave, thirteen bifaces, two flat-topped end scrapers, and one crude plano-convex end scraper. This assemblage, in view of its stratigraphic position, is classified as a probable Taye Lake component.

JfVb-7. This manifestation was originally found by E. D. Kindle in 1946 and we revisited it in 1957 and 1959. It is located on the east side of Cranberry Creek that drains into the south end of Taye Lake (Fig. 78). Specifically it is situated on the highest terrace just before it blends into the hills north and west of the creek. The artifacts were eroding out, or were picked out, of the bank from a thin stratum about three hundred yards long. This dark stratum including the artifacts is just under the volcanic ash which lies under two feet of silts and humus and above a stratum of mature soil one foot thick. This latter overlies the terrace gravels. Artifacts included thirty-five bifaces, thirteen side scrapers, three blades, two crude plano-convex end scrapers, one flat-topped end scraper, one end-of-blade end scraper, and one Anderson point. It seems to be a Taye Lake component.

IeSh-1. The Callison site in northern British Columbia is included with the description of sites from the southwest Yukon. Johnson and Raup made a large surface collection from this site in 1944 (Fig. 44). Though it lies a long distance from the rest of the sites, it has been included because the material from it ties in closely with that from the Yukon. Also, it yielded a large sample of excavated artifacts and it was excavated at the time we were surveying in the southern Yukon.

The site, IeSh-1, was located on and under the farm, restaurant, and lodge of E. Callison south of the Alaska highway, at Mile 422 in northernmost central British Columbia. It was just west of the pass between Racing and Toad Rivers in the center of a triangular basin surrounded by jagged mountains. In the southern portion of this basin were the remains of a small pothole-like basin, which was drained by a creek flowing north from the northeast portion of this almost extinct lake. The basin of the former lake was surrounded by a steep bank about fifteen feet high (MacNeish 1960b).

Surface collections made on June 20-24, 1957, revealed chips and artifacts spread over the top of the bank from the drainage creek westward for a distance of about two thousand feet. They did not seem to extend back from the bank of the lake for more than two hundred feet, though construction along the Alaska highway had somewhat disturbed the northern part of the site. After considerable examination of various cross-sections along the bank of the various modern excavations, it was decided that the area along the bank from the edge of the barns and corral to a drainage ditch about seven hundred feet to the west had the greatest concentration of artifacts.

Seven test pits were sunk in this area during June and in early September. Five of these were close to the bank, and two were some distance back from it. All were oriented along the cardinal coordinates and were connected by a grid system. For convenience, these tests will be referred to as pits one to five and trenches one and two. The two farthest from the bank, test pits two and four, revealed a few chips and a seven inch layer of reddish soil underneath the humus, but they contained no artifacts. Along the bank, test pit one, farthest west, had about a dozen chips and one flat-topped, snub-nosed end scraper in it. All were in the reddish soil about two inches below the bottom of the humus. Test pit three revealed many more chips in the reddish-brown soil as well as two pieces of burned bone. The bone was about one foot southwest of the northeast corner of the square and was associated with a chopper, which was two inches above a side scraper. Test pit five also contained chips and artifacts in the red soil immediately below the humus. Eight of the ten prismatic or truncated blades appeared in the southeast quarter of the square, while one was in the center, and one four inches east of the center.

Trench one was five feet wide and about twelve feet long. About six feet from its south end was found an area about two feet in diameter which contained four fire-cracked boulders, a large quantity of small fragments of burned bone, mainly from small mammals and sheep or moose, as well as artifacts and chips. Chips were profuse, and seven side scrapers and two end scrapers came from the area of burned bone, while three side scrapers were just north of it. Two blades, two bifaces, and two point fragments were just south of the burned area. Though the chips, bones, and artifacts showed a considerable range of depth, some occurring just below the humus and other six inches below it in the red soil, the greatest concentration of bone and artifacts, as well as a lens of ash was located two to three inches below the bottom of the humus. These materials probably represent a floor level of the ancient inhabitants of the site.

Trench two was the larger and was farther to the east. The trench consisted of four connected five foot squares parallel to a series of three more. It was excavated between a small shack and the edge of a roadway leading from the barracks to the basin of the extinct lake. Chips were abundant in all squares, and their depth ranged from one to six inches below the humus in the red soil. As in trench one, there was a definite concentration of them about two inches below the humus. There was a single conical pit in the southwest portion of the trench. It was about sixteen inches in diameter at its mouth and extended down from the red soil into the yellowish loam for about nine inches. In it were five thin side scrapers retouched on one edge, two large single-edge scrapers, and parts of four bifacial choppers and knife blades. Besides these artifacts, seventy-two more were found scattered throughout the trench.

Summary. The archaeological provenience of the artifacts of trench two, and probably trench one, indicates that we were dealing with cultural

remains which were roughly contemporaneous. The hundred or so artifacts from these trenches, as well as from the other test pits, composed a distinct archaeological complex consisting of the following types: thin and thick flake side scrapers retouched along one or both dorsal edges; flake spokeshaves; triangular, oblong and end-of-blade end scrapers; small, round and large, irregular plano-convex end scrapers; microblades and blades; unnotched and side-notched concave-based projectile points; ovoid and square-faced bifacial knives; choppers; disks. A comparison of the complex of artifacts with the two hundred from the surface collections by both Johnson's party and mine reveals only one additional artifact type, a tongue-shaped core. For this reason I believe it is safe to conclude that all artifacts from the site belong to a single artifact complex and are probably roughly contemporaneous.

Again we are faced with the problem whether this site is the remains of a huge camp occupied at one time or due to numerous small camps set up by people with the same cultural habits who visited the place during a period of time. Our evidence from excavation does not resolve this problem. An examination of the burned bone from trench one revealed mainly small mammals and a few moose (?) bones but no fish or bird bones. This absence, along with the lack of net sinkers, may indicate winter occupation but the evidence is not conclusive.

The evidence of the bone, however, when taken in conjunction with the types of projectile points and meat cutting and skinning tools does indicate that one of their main activities while at the site was hunting and trapping. The numerous skinning tools, side scrapers and end scrapers show they worked skins and were perhaps manufacturing clothing. The numerous chips, unfinished artifacts, polyhedral cores, unused blades and bifacial choppers or cores, however, show that a prime activity was the making of artifacts.

A closer examination of the artifact types reveal that this component is closely related to or belongs to the Taye Lake phase. Found at Callison were such typical Taye Lake traits as Refugio, Besant, Lockhart, and Whitehorse points, numerous bifaces including square-based bifaces, notched end scrapers and crude plano-convex end scrapers as well as numerous flat-topped end scrapers, spokeshaves, large side scrapers often with two edges retouched, many more blades than microblades, tabular and conical polyhedral cores and a single tongue-shaped core.

The preliminary testing of this site and its relative richness, as well as the preliminary classification and analysis of the excavated artifacts reveal that it is an important site in northern British Columbia. It is hoped that some day it may be more thoroughly investigated.

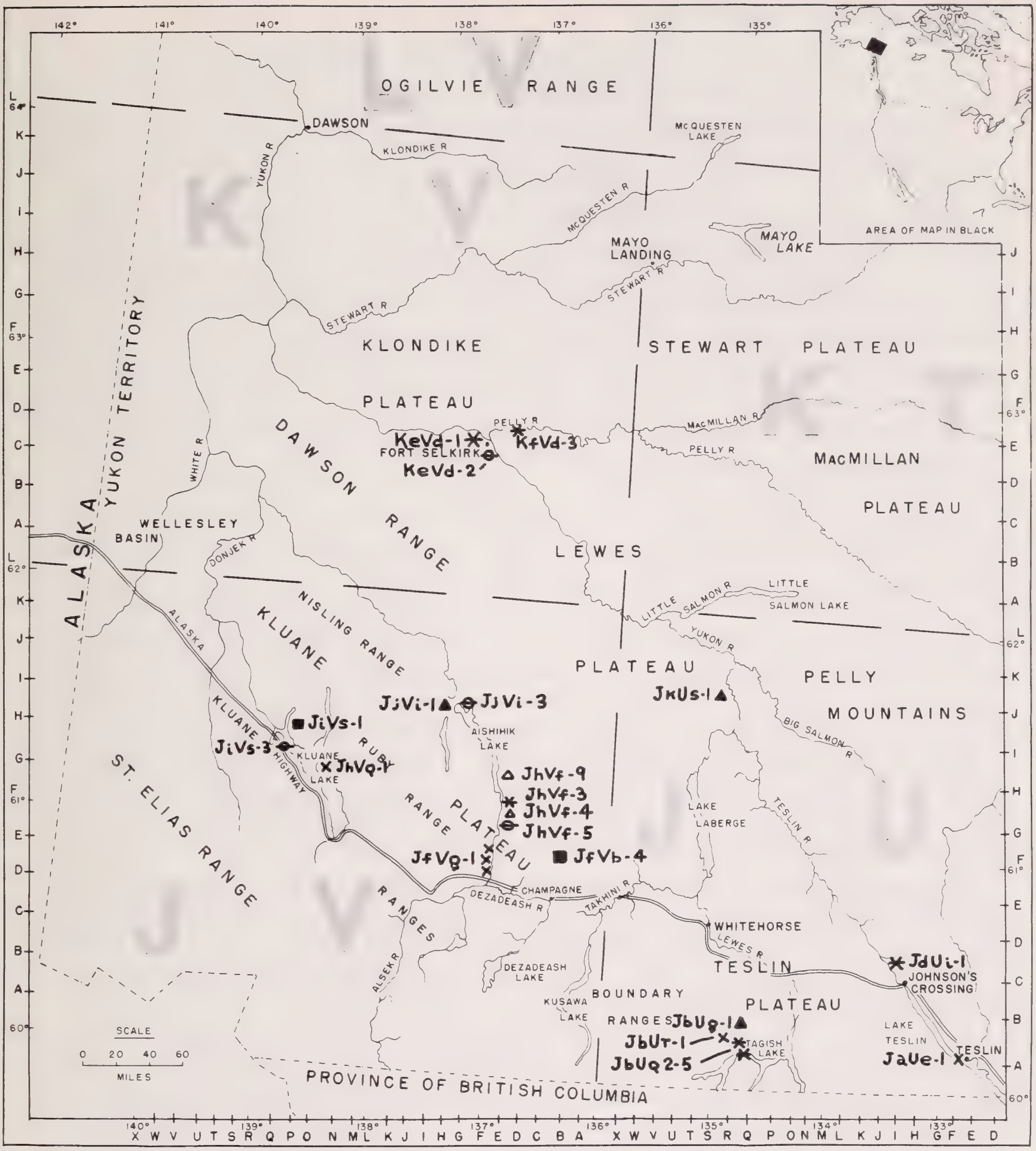


Fig. 79. Distribution of Aishihik and Bennett Lake components.

Aishihik components

Probable

Possible

Bennett Lake components

Pure

Probable

Possible

Probable Aishihik Components

JhVf-5. This site was situated just south of the road on the second northward projecting point two miles north of Canyon Lake along the stream flowing south from Aishihik Lake (Fig. 79).

Originally we found an Aishihik point in the road and had decided to make a more formal excavation along the west edge of the road. However, before we had completed the first three five-foot squares it became apparent that artifacts were extremely rare and the site was less than twenty feet in diameter. All the artifacts appeared below the humus but above volcanic ash. They included one thin biface, one ovoid biface, six chi-tho fragments, one flat-topped end scraper, one thumbnail end scraper, a point fragment, and three side scrapers. This assemblage including the Aishihik point, indicate that it probably was a small Aishihik component.

JiVs-3. This ancient camp was located on the terrace just in back of the Burwash Lodge on the west side of Kluane Lake (Fig. 79). Johnson in 1944 excavated and found a number of artifacts from just above the volcanic ash. I was unable to find his tests which I believe have been destroyed by modern construction. However, at the point of this terrace just above the bridge in back of the hotel we found other artifacts in the same stratigraphic position and I have assumed they are from the same site. The three-quarter grooved adze, the Aishihik point, the notched end scraper, two flat-topped end scrapers and one ovoid end scraper, the two thumbnail end scrapers, the two chi-thos and side scrapers are reasons for classifying this site as a probable component of the Aishihik phase.

JjVi-3. On the east side of Aishihik Lake on the point at the north end of Soldier Bay was an old camp site (Fig. 79). From the bank we picked out artifacts and chips from above the volcanic ash. The Besant point and the Anderson point, the chi-thos, and scrapers suggest an Aishihik phase site.

KeVd-2. Artifacts were found along the top of the bank of the Yukon River across from the entrance of the Pelly River in the Southernmost part of the cleared area of Fort Selkirk (Fig. 79). They were dug out of a burned layer lying between the humus and volcanic ash. The types found were an Anderson point, one Catan point, three point tips, one thin biface, three biface choppers, or chi-thos, three thumbnail end scrapers, an ovoid end scraper, one flat-topped end scraper, and two side scrapers. The assemblage is probably an Aishihik component.

Probable Bennett Lake Components

JhVf-4. Situated on the second northward projecting point two miles north from Canyon Lake along the stream flowing south from Aishihik Lake was a large site (Fig. 79). At this point there are at least two sets

of rapids and the point is on the high terrace between fifteen and forty feet above the river. The western fringes of the point have some trees on them, but much of it is bare and rocky, the vegetation and humus having been burnt off. Because of this bareness it was relatively easy to see the patches of refuse and find material.

The site was found in the survey of 1957 and we returned to it in 1960 for further testing. Because the best digging areas could be seen from the surface we concentrated on them. In digging, the top one or two inches of ash or humus were scraped off and then the human remains were excavated more carefully by trowel. We usually excavated completely one of these patches from one edge to the other. In certain spots the human remains overlay the volcanic ash. No formal grid system was set up, but the excavated patches were noted on a contour map.

Area two was a patch of refuse about fifteen feet in diameter having a maximum thickness of three inches. It was located in the southeast corner of the site. In approximately the central portion of it a number of fire-cracked rocks were located. This was a large quantity of bone, but only four scrapers were found. Area seven was directly east of it about seventy-five feet, and burned bone and fire-cracked rock covered an area about six feet in diameter. An abrader and a thumbnail end scraper were found as was burned and unburned bone. Area three was about thirty feet north of area two. It included a group of boulders which were carefully excavated because it was possible that they had been part of a tent ring. Though we cleaned off an area of twenty feet by fifteen feet, ash, bone, and artifacts occurred only in one depression which was about four inches deep and four feet in diameter. The artifacts were limited to some projectile point fragments and scrapers. The rocks of the supposed tent ring were naturally deposited. Area eight was about forty feet west of area three and was an oval patch of refuse six feet by three feet including much burned rock. A number of chi-tho fragments, an end scraper and a little burned bone were found in it.

About seventy-five feet north and east of area three was a large patch of refuse called area four. This refuse covered an oval area which was twelve feet east and west and about six feet north and south. Burned bone and earth reached a maximum depth of five inches and there was an area three feet in diameter in the east end filled with fire-cracked rock. Also in the center of this area was a conical pit about one foot deep and seventeen inches in diameter. This contained unburned bones of rodents, martin, beaver and rabbits. This is believed to have been a storage pit. Artifacts were distributed throughout the refuse but not in the pits. They included chi-thos, end scrapers, bone awls, bifaces, small arrow points, and many small flake side scraper fragments.

Area five was about eight feet north of this large area in a patch of burned bone three feet in diameter which included a chi-tho, scraper and a piece of an unfinished adze. Area six, roughly the same size, was eleven feet directly west of it. It contained chi-thos, burned moose bone, burned bone tools, and an end scraper. Nine feet farther west was area

nine which was a patch of burned earth three feet in diameter with a large side scraper in it.

Area one, which was about eight feet in diameter, was ten feet west of area nine. This region contained a great mass of burned bone, mainly of rabbits and moose, and fire-cracked rock as well as chi-thos and side scrapers.

The similarity of the artifacts from the different areas and their occurrence in the same stratigraphic position leads to the conclusion that they were left behind by a single cultural group. The complete absence of any burned bird bone or fish bone leads to the conclusion that JhVf-4 was a winter occupation. The neat little patches of refuse suggest that each one represents the refuse of a single habitation and that perhaps eight or nine family groups or tents were together during the same winter. The possibility that some of these occupations were during different winters remains, but, if so, why were they so well spaced over roughly the same area?

Activities of this group also have a winter look to them. A few moose and sheep bones were found with the arrow points and the site is at a prominent game crossing. All this suggests winter hunting. The beaver, martin, rodents, and rabbits, of course, indicate trapping which seems to have been even more important than the chase. The butchering of the animals and cooking them is again obvious, while the scrapers and awls indicate that their skins were being made into clothing. A few chips and incomplete artifacts may mean some manufacture of tools. Interpreting the burned area and patches of burned bone at the site, from my own miserable experience in sub-Arctic winter, may mean that most of their time was spent trying to keep warm, fed, and alive.

Artifacts were fairly numerous and included a bone tube, a piece of ground slate, three bone awls, two bifaces, one pebble hammer, twelve thumbnail end scrapers, sixteen chi-thos, three flake end scrapers, two ovoid end scrapers and a flat-topped end scraper, twenty-one side scrapers, five point fragments, two Stott, one Catan, and barbed bone arrow points. This fairly good sample of artifacts allows it to be classified as a Bennett Lake component. Some of the minor differences in artifacts between this assemblage and other Bennett Lake components may well be due to the fact that this one was a winter camp.

JbUg-1. The ancient refuse was situated on a high terrace just across the bay, south from the Indian school on Lorne Lake, north of Carcross. The majority of the artifacts came from excavation of two ash beds eroding out at the bank of the lower part of the humus (Fig. 79). Artifacts included one Catan and one Prairie side-notched point, three thumbnail end scrapers, two chi-thos, one gun flint, two bifacial choppers, one ovoid biface, one biface fragment, two thin side scrapers retouched along one edge, one thin side scraper retouched along two edges, and some glass beads. This is a typical Bennett Lake component.

JkUs-1. This ancient camp about fifty feet in diameter is on a terrace sixty feet high north of Fyfe Creek and Lewes River (Fig. 79). It

lay at the base of humus overlying red soils above a volcanic ash layer. Artifacts included one thin flake side scraper chipped on one edge and two chi-thos. It is a component of either Bennett Lake or Aishihik. All artifacts were found by excavation.

JhVf-9. This archaeological manifestation was on the east end of a small bridge-like peninsula striking out from the east into the middle of Hopkins Lake at mile 33.3 on the Aishihik road (Fig. 79). A crude Plainview point, a Stott point, one keeled end scraper, one thumbnail end scraper, a chi-tho, and a thin side scraper occurred in burned earth above the volcanic ash. The site was about fifty by twenty feet. The chi-tho, Stott point, and thumbnail end scraper, plus its stratigraphic position, hint it was probably a small Bennett Lake component.

JjVi-1. This site was situated on the shore of a bay opposite the present Indian village at the north end of Aishihik Lake (Fig. 79). A small stream runs into the bay between the village and the site. Eroding out of sand and ruined house structure were ground slate, a bird bone bead, glass beads, three chi-thos, a thumbnail end scraper, a large flake end scraper, a chopper-like tool, a side scraper, and a couple of pieces of beaten native copper. It is probably a Bennett Lake component.

POSSIBLE COMPONENTS FOUND IN ARCHAEOLOGICAL RECONNAISSANCE AND SOME UNCLASSIFIED SITES

Possible Champagne Components

JbUg-4. A firepit was eroding out of a sand dune about one mile west of Carcross and two hundred yards north of Bennett Lake (Fig. 76). Artifacts uncovered from the surface, which seemed to be a single component, were one Agate Basin point, one keeled end scraper, two thin flake side scrapers retouched along one edge, two thin flake scrapers retouched along two edges, one thick flake retouched along two edges. The projectile point suggests it might possibly have been a Champagne phase occupation.

JbUg-6. The material from this site was picked up in the barrow pits at the edge of the south end of the Carcross airport by K. McClellan and me (Fig. 76). They included a Milnesand point, one neatly chipped plano-convex end scraper, one ovoid biface, one thin side scraper with one edge retouched and one with two edges retouched. The projectile points suggest that this may have been a Champagne phase site.

JfVg-2. A place having ancient remains was located at the junction of Canyon Creek and a stream northeast to southwest across the Aishihik road at mile 1.7. It was situated on a high terrace which is about one mile west of the Canyon-Aishihik road (Fig. 76). A thick side scraper and a Milnesand point were collected. The point type suggests that this was a Champagne component.

JgVd-1. This site was situated on the terrace in front of the houses at Hutshi Village on North Hutshi Lake (Fig. 76). A Milnesand point, two side scrapers, and an end scraper were found. It might possibly be a Champagne component.

JhVf-6. An archaeological manifestation covering an area about twenty-five feet in diameter was found just north of the rapids at the south end of Aishihik Lake, on a terrace about sixty feet above the east edge of the southward-flowing stream (Fig. 76). It was also about one mile west of mile post 27 on the Canyon-Aishihik road. The Agate Basin point, the two keeled end scrapers, and the side scraper suggest that it may have been a Champagne component.

JiVs-4. This site was located on the ridge just north of the air strip near Burwash about two miles west of Kluane Lake (Fig. 76). The artifacts seemed to be eroding out from below the volcanic ash at the bottom of reddish brown (Kluane) silt and included a side scraper, a neatly chipped plano-convex end scraper, an Agate Basin and a Milnesand point. This suggests a Champagne occupation.

JjVj-4. We found artifacts under the volcanic ash on the high terrace north of Sekulmun Lake, one-half mile east of Albert Creek and on the first point to the east of this creek (Fig. 76). The Agate Basin point, biface fragment, end scraper, and side scraper suggest a Champagne component.

KjTx-3. On the high terrace north of the Mayo Landing airfield about one-half mile west of the highway we discovered a fireplace which contained chips, burned bone, a side scraper, five end scrapers, and a crude Plainview point (Fig. 76). It may possibly be a Champagne component.

Possible Little Arm Components

JeVc-5. On top of the moraine just south of Champagne, Johnson and I collected material from the surface. The two Agate Basin and one Milnesand points, two end scrapers, thirteen side scrapers, one blade, and two microblades indicate the possibility that this was a Little Arm component (Fig. 77).

JhVh-1. This ancient camp was at the north end of Ittlemit Lake on top of a terrace twelve feet above water at the end of a pointed swampy bay (Fig. 77). A biface, three thin side scrapers, a neatly chipped plano-convex end scraper and a microblade suggest it was a Little Arm component.

JiVg-1. Ancient remains were found on the west side of the Talbot Arm of Kluane Lake about one mile north of the entrance (Fig. 77). They were situated on the south end of a very high terrace that skirts the hills on the Talbot Arm, at the place where it turns to run east and west along the edge of the hills. The side scraper, blade and three microblades and bones eroding out of the bottom of the reddish brown zone of the Kluane silt under the volcanic ash hint that this is a Little Arm component.

JjVi-2. This manifestation was on a small bluff overlooking a lake on the west side of the Aishihik road at mile 67.1 (Fig. 77). Materials were being eroded out of the lower reddish soil under the volcanic ash. On the basis of two keeled end scrapers, a flake end scraper, and a fine prismatic microblade this site has been tentatively classified as a Little Arm component. Also found were an ovoid biface, a thin biface fragment, a point tip, a spokeshave, and two side scrapers.

JjVj-2. This ancient camp was located on the high terrace to the north of Sekulmun Lake on a point where Albert Creek cuts through the terrace to the west (Fig. 77). This may have been a Little Arm site for we found on the surface a blade and a microblade, an Agate Basin and a Plainview point, two keeled end scrapers, one flat-topped end scraper, a side scraper, and a biface.

KjTx-1. Artifacts were picked up on the high terrace north of the airfield at Mayo Landing about one-fourth mile west of the airfield (Fig. 77). The two microblades, blade, side scraper, and Agate Basin point suggest a Little Arm occupation.

KaVa-1. Eroding out of a small sand dune at mile 95.2 on the Whitehorse-Carmacks highway were four fine microblades (Fig. 77). It is possible this was a Little Arm component.

KeVd-3. About two miles south of Fort Selkirk, on the high terrace above where the trail or road goes into the water, we found chips and a

tongue-shaped polyhedral core (Fig. 77). This core suggests a Little Arm site.

Possible Gladstone Components

JhVf-1. The ancient habitation area was on a high bank at the first point on the east side of the rapids north of Canyon Lake along the portage to Aishihik Lake west of mile 25 on Aishihik road (Fig. 77). One microblade and one flat-topped end scraper are evidence that it possibly was a Gladstone site.

JjVi-5. This old camp was situated at the west end of the Aishihik airstrip along the side of the road leading down to the lake (Fig. 77). It was right at the break in the slope leading down to the lake. Artifacts came from below the volcanic ash in reddish brown soil. A microblade and Besant point suggest a possible Gladstone component.

JjVj-3. The archaeological manifestation was located on the high terrace on the north end of Sekulmun Lake, in the blowout area about one-quarter mile from Albert Creek and next to JjVj-2 (Fig. 77). The three microblades, two blades, point tip, and the thick side scraper may belong to a Gladstone phase.

JjVj-5. Artifacts were collected on the high terrace at the north end of Sekulmun Lake on the third point about one mile east of Albert Creek (Fig. 77). The blade, microblade, Besant point, two flat-topped end scrapers, biface, and three side scrapers suggest a Gladstone component. One of the scrapers came from the top of the reddish soils below the volcanic ash.

Possible Taye Lake Components

JcUj-1. A spot producing artifacts was located on a bluff just above the west side of Squanga Lake on the south side of the highway (Fig. 78). It contained two blades and three microblades. The blades suggest it is possibly of the Taye Lake horizon. A nearby site found by Johnson belongs to a complex not yet identified (Fig. 43).

JcVe-1. We made a surface collection on the high terrace against the hills on the east side of a dry creek flowing into the Kluhini River just west of Dezadeash Lake (Fig. 78). Artifacts include four microblades, a tabular-polyhedral core, two thin side scrapers, retouched on one side, one thin side scraper retouched on two sides, one thick side scraper retouched on one side, one thick side scraper retouched on two sides, two point tips, a Refugio point, two ovoid bifaces, a square-based biface and one biface fragment, three flat-topped end scrapers, and an end-of-blade scraper. This assemblage possibly belongs to the Taye Lake phase.

JeVc-6. This site was the next blowout to the west of JeVc-2, one-

half mile south of Champagne along the river edge (Fig. 78). The Anaktuvuk burin, blade, side scraper, and flat-topped end scraper allow one tentatively to classify the site as a Taye Lake component. The artifacts apparently came from a humus layer under the volcanic ash.

HjRr-1. This archaeological manifestation was located on the west side of the Alaska Highway at mile 203 near Trutch, B. C. It was a high terrace on the north side of a small stream. Before a grizzly bear ran us off the site, we collected a blade, an end-of-blade scraper, one ovoid end scraper, three flat-topped end scrapers, a biface and point fragment, and two side scrapers. It is possible that these remains are related to the Taye Lake complex.

JiVs-5. An ancient camp was situated on the high terrace on the north side of the Kluane River mouth where it enters Kluane Lake (Fig. 78). The artifacts were picked out of a brown soil probably Slim's River silt, just under the volcanic ash. The presence of an Anderson point, a Besant point, an Agate Basin point, one flat-topped end scraper, one blade, two microblades, and four side scrapers suggests a Taye Lake component.

KbVa-1. This ancient camp was found on a hill in the road overlooking the northwest corner of Tatchum Lake about three and six-tenths miles east from the Whitehorse-Dawson highway (Fig. 78). There was found under the volcanic ash a microblade, a blade, three side scrapers, and a fragment of a three-quarter grooved adze. This site has been tentatively classified as a Taye Lake component.

KfVh-1. On the north side of the Yukon river across from the mouth of Britannia Creek, on a high terrace just east of a small stream, artifacts were found under the humus in a burned layer (Fig. 78). The pebble chopper, a large Anaktuvuk burin, two blades, one thin side scraper, and two large crude plano-convex end scrapers indicate that this site is possibly a Taye Lake component.

KiVc-1. A rather large site was situated on a high, rocky, mesa-like hill on the north side of the Stewart River next to mile 8.4 on the Dawson-Mayo road. The three blades, a flat-topped end scraper, and three side scrapers suggest a Taye Lake component.

KkVa-1. On the west side of Minto Creek on the second point on a high terrace before it enters Minto Lake, we collected on the surface a crude blade, a microblade, and a point tip (Fig. 78). This might be a Taye Lake component.

Possible Aishihik Components

JaUe-1. A few artifacts were found on the high bank at the western junction of the lake and Teslin River (Fig. 79). One Besant and one Whitehorse point, a three-quarter grooved adze, two round plano-convex end scrapers, and one flat-topped end scraper were very tentatively assigned to the Aishihik complex. The lack of blades and presence of adze

and round plano-convex end scrapers renders the classification uncertain. These were collected by D. Leechman and K. McClellan.

JbUr-1. We found an ancient camp on the 40-foot terrace on the east side of the swamp at the north end of Annie Lake about one hundred feet south of the road (Fig. 79). Artifacts included an Anderson point, a chi-tho, and a thin side scraper retouched along one edge in the sands at the base of the humus. The point and chi-tho suggest that this was an Aishihik occupation.

Possible Bennett Lake Components

JbUq-2. Artifacts were located in the sand dunes along the road to air port from Carcross (Fig. 79). These were one Stott and one Prairie point, one point tip, three thumbnail scrapers, one flake end scraper, four fragments of chi-thos, a three-quarter grooved adze, one biface chopper, and one side scraper retouched along two edges. All were collected on the surface by D. Leechman. The artifact assemblage, if it is one component, is most similar to Bennett Lake.

JdUi-1. On the low terrace on the east bank of Teslin River just south of the cabin and opposite the mouth of Squanga Creek were the remains of an old habitation (Fig. 79). The material lay on beds of ash and fine crushed rock at the bottom of the humus. Artifacts include a square-based biface, one pointed side scraper, one thin side scraper retouched on one edge, a flake end scraper, and three chi-tho fragments. It seems to represent either a Aishihik or Bennett Lake occupation.

JbUq-5. At the northwest corner of Bennett Lake, near Carcross, a side-notched point and chips were found on the surface (Fig. 79). This may be a Bennett Lake component.

KeVd-1. This site produced a large bone awl, curved paddle, side scraper, thumbnail end scraper. This is a possible Bennett Lake component (Fig. 79).

KfVd-3. This site was located on the tip of the first point upstream from the Pelly Farm. It was at the river's edge on the top of an eight foot bank. The chi-tho and thumbnail end scraper indicate it was a Bennett Lake component (Fig. 79).

JhVf-3. On the point just above Canyon rapids we found a Bennett Lake chi-tho and side scraper (Fig. 79).

Unclassified Sites

JaUu-1	Milnesand point.
JaUv-1	Small biface.
JbUn-1	Historic cremations.
JbUg-3	One thin side scraper with one edge retouched.
JcUi-1	One side scraper, one thumbnail end scraper, one biface chopper and one caribou cannon bone.

JcUn-1	Two neatly chipped end scrapers, one flat-topped end scraper, one crude plano-convex end scraper.
JdUp-1	Broken point tip, one thin one-sided scraper, one chi-tho.
JeUs-1	One biface.
JfUm-1	Two thin flakes with one edge retouched, two chi-thos, one flat-topped end scraper above volcanic ash.
JhUu-1	Chips, one chopper and one large side scraper.
JiUw-1	One thin flake side scraper with one edge retouched, one biface chopper under volcanic ash.
JfVb-2	One biface fragment.
JfVb-3	One flat-topped end scraper, one spokeshave, five scrapers, one biface fragment.
JfVb-6	One thumbnail scraper, one spokeshave, one biface chopper.
JfVc-1	Four side scrapers, two biface fragments, one crude plano-convex end scraper.
JfVc-3	One side scraper.
JgVf-1	One side scraper, two chips.
JhVf-2	One end scraper, two chips.
JhVf-7	One crude plano-convex end scraper.
JhVf-8	Two ovoid bifaces.
JhVr-1	Two chi-thos, one crude plano-convex end scraper, one side scraper, two bifaces.
JiVg-1	One thin flake side scraper with two edges retouched, chips.
IwTl-1	One chopper and one end scraper, and chips.
IgSk-1	One biface fragment, chips.
JjVi-4	Two net sinkers.
JjVj-1	One thumbnail end scraper.
JjVj-6	One keeled scraper and a point tip.
JkVx-1	One side scraper, chips.
KjTx-2	One biface, two side scrapers.
KkTx-1	One side scraper.
KlTx-1	One large side scraper.
KbVo-1	Two side scrapers.
KeVd-4	One side scraper.
KeVh-1	Side scraper, thumbnail end scraper.
KfVd-1	One side or end scraper.
KkVa-3	One flat-topped end scraper.
LaTw-1	One side scraper.
LaVk-1	One side scraper.
LdTu-1	One side scraper.
LbVl-1	One pebble chopper and two side scrapers.

SUMMARY OF THE CULTURE PHASES OR COMPLEXES

The Kluane Complex

The Kluane complex is the most poorly defined of our cultural complexes in the southwest Yukon. Only one possible component, a floor with nineteen artifacts, occurred in Zone G, the yellow zone of the Kluane silt and the lowest layer of the Gladstone site (JhVq-1). (Fig. 76). The Lerma-like points, scraping planes, and pebble chopper were unique traits not often appearing in later horizons. Johnson found a similar chopper in the yellow zone of the Kluane silt at a site on Christmas Creek, Kluane Lake (Fig. 36, No. 9). He also found a Lerma-like point on the top of the unglaciated plateau north of Kluane Lake (Fig. 42, No. 8). These types are sufficiently distinctive to allow the complex to be classified as a separate culture entity. The blades, microblades, and split pebble chopper are also important distinctive traits found in this component which continue into later horizons. The side scrapers are generalized traits. This meager inventory permits only a few tentative statements to be made about the way of life of these people (Fig. 80).

The thin, small charcoal floor in Zone G suggests that it was occupied by a nomadic microband. The Gladstone site's location on a game trail, the projectile points and the scraps of large mammal bone suggest these people were big game hunters. Retouched unifaces could have been used to cut meat while choppers might have been used to break up the bone so that marrow could be extracted.

Flint knapping was an important industry. Three techniques of manufacture were employed. Scraping planes and choppers were made by percussion flaking on flint pebbles. Other tools, such as projectile points and scrapers, were manufactured by removing flakes from cores by percussion flaking and then retouching them into their desired forms. The blades (and the microblades) suggest that nodules of flint and obsidian were fashioned into conical (?) polyhedral cores by percussion and then blades spalled off their fluted surfaces by percussion, or pressure flaking.

The scrapers suggest that skins may have been worked. Perhaps the side scrapers were utilized for skinning the animals and for cutting up the skins while the scraping planes were used for fleshing.

The projectile points must have been hafted in shafts and blades may have been set as side blades in handles. It follows that bone or wood was also worked, but how extensively we do not know.

The Champagne Phase

There are thirteen components of the Champagne phase, but only floor four of the Pelly Farm site (KfVd-2) had an adequate sample of

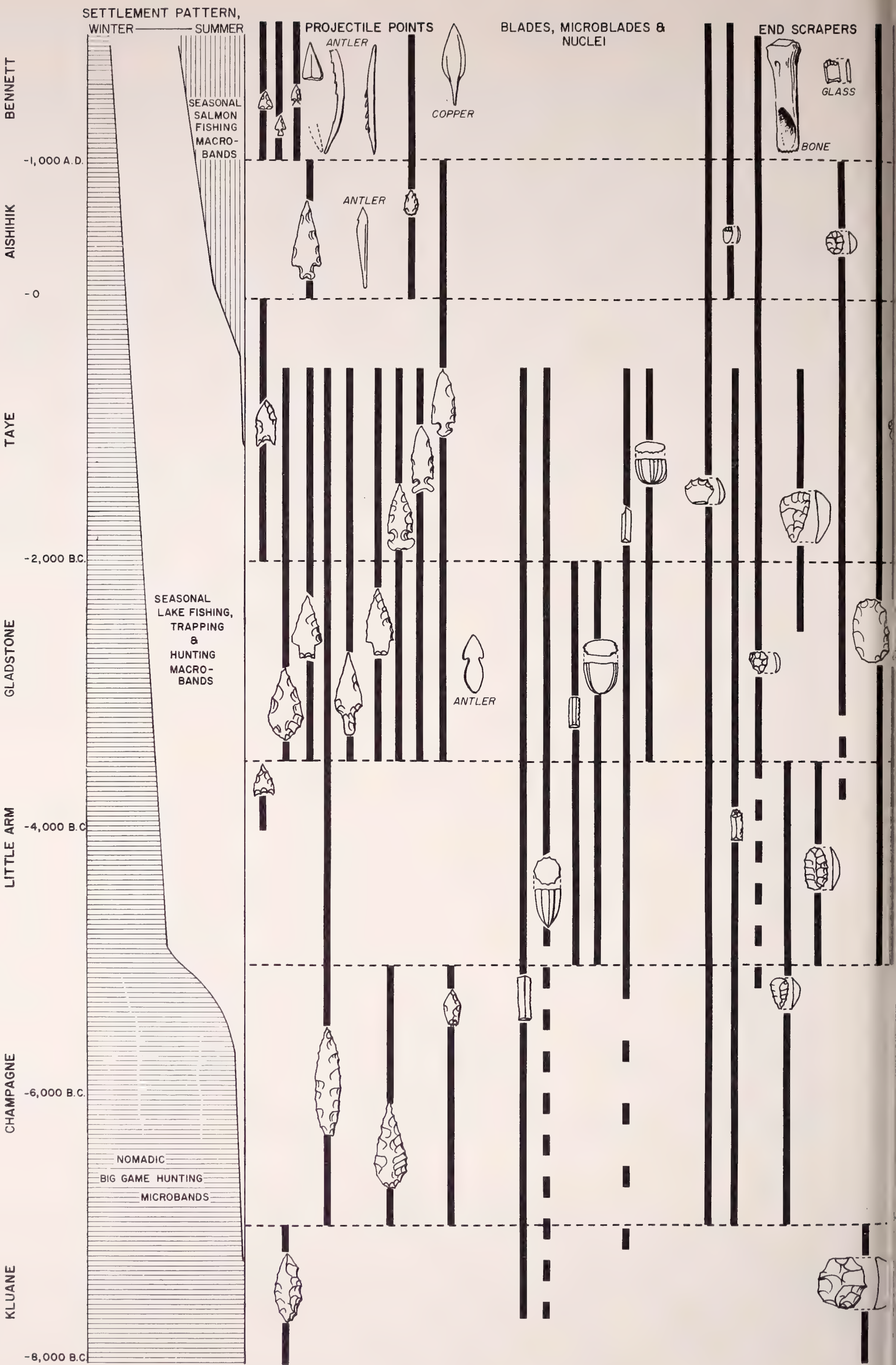
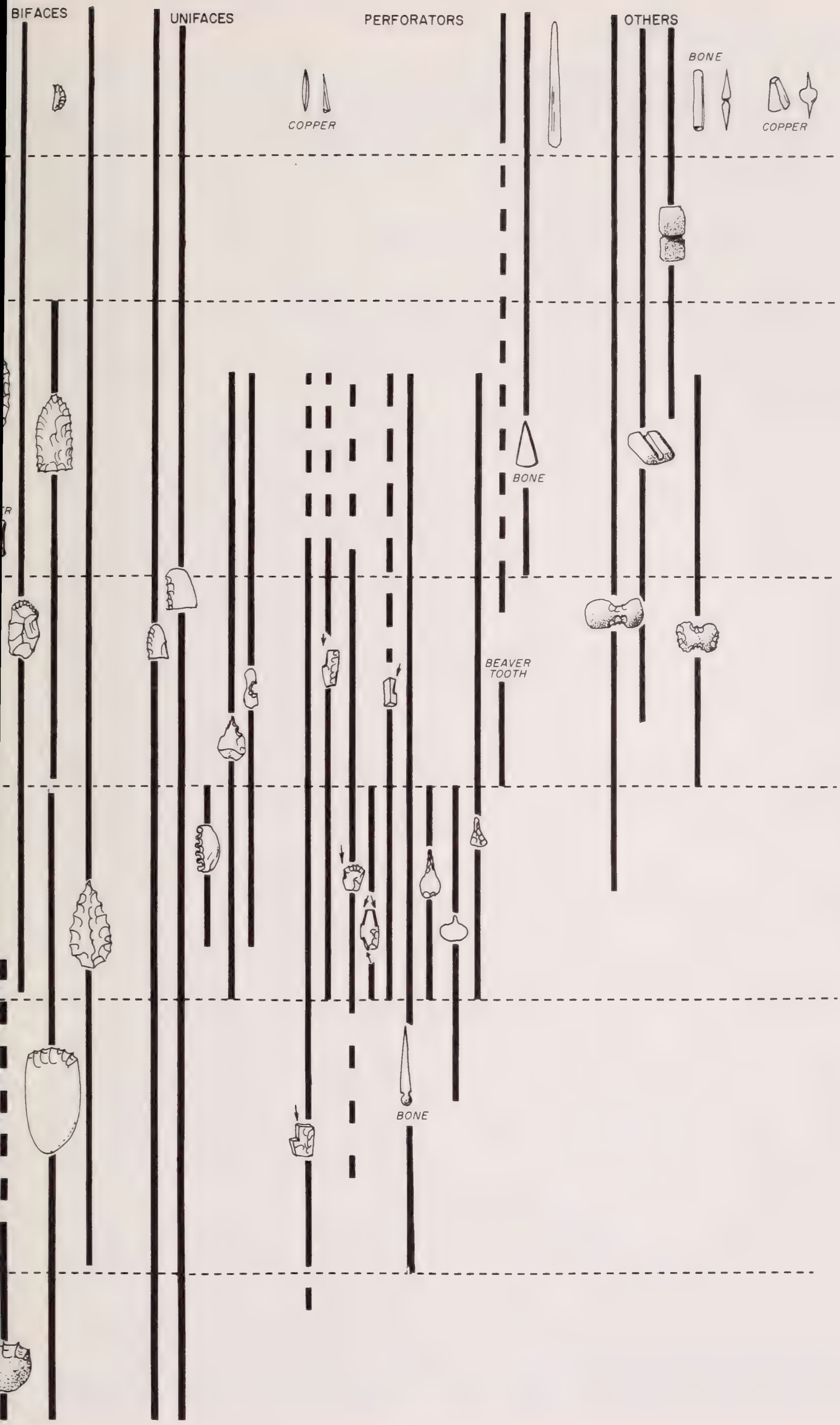


Fig. 80. Diagram of sequence of diagnostic artifacts by phase or complex.


BIFACES
UNIFACES
PERFORATORS
OTHERS
BONE
COPPER
COPPER
BONE
BEAVER TOOTH
BONE

artifacts, that is one hundred twenty-nine, in a well-defined occupational layer. Three other excavated components, floor five of KfVd-2, JeVc-3, KfVe-1, had limited samples, while collections of a lesser number of artifacts from nine surface sites are such that they can only be considered possible components (Fig. 76). Only the Pelly points, the rib bone point, and the teardrop-shaped variety of Agate Basin points are unique to this horizon. However, keeled end scrapers, slab choppers, Agate Basin points, gravers, Fort Liard and artifact burins are found in maximum numbers in this horizon and diminish in popularity in later ones. Also blades and end-of-blade scrapers appear to be diagnostic of the phase. Other tools were general types of artifacts such as various kinds of scrapers and bifaces (Fig. 80).

All components, excepting floor four of KfVd-2, covered small areas and refuse was uniformly thin, suggesting that these people were usually nomadic microbands. Ten of the thirteen components were located on game trails along streams, by rivers or lakes, or in mountain passes. Osteological remains revealed that they hunted mainly buffalo and elk and only occasionally muskox and caribou. Remains of small game are rare. The killing of these large animals was accomplished with lances or darts tipped by bone or unnotched, large chipped projectile points. At the Pelly River farm site, animals were evidently killed, butchered at the kill, and various sections of the carcasses, except the skull, were carried to camp. In butchering the animal, retouched flakes and bifacial knives were used. In the camping area, the meat was roasted over hearths which included pebbles. The long bones were split open for marrow, by split pebble choppers, or by slicing with burins. Three sites are on low terraces next to lakes. On rare occasions the people may have fished.

Flint knapping was a major industry. A few tools such as the split pebble choppers were made by percussion flaking. Many tools, however, were made from flakes struck from cores by percussion flaking using pebble hammers and then pressure flaked into their desired forms. On some of the bifacial projectile points, before their final retouching, an additional technique was used. The surfaces were retouched by controlled or indirect percussion flaking, resulting in ripple flaking. Also, most of these projectile points have had their bases and lateral basal edges ground. The technique of making conical (?) polyhedral cores and the resultant blades continued to be used. One other additional flint knapping technique has been added. In it flat flakes or broken scrapers were struck by percussion to produce burins.

Fibula awls and rib bone points were made by grinding bone. Burins indicate the possibility that bones were slotted for the insertion of handles. Handles for end scrapers and knives may also have been manufactured from bone.

Side scrapers and bifacial knives may have been used to cut skins, and end scrapers may have been used to clean and flesh hides. The graver and fibula awl may have been used to drill holes in leather so that

it could be sewed. The implication that tailored clothing was made is simply speculation. It is also possible that the gravers were used to pierce bone to make needles.

The Little Arm Phase

Fourteen components of the Little Arm phase are known (Fig. 77). Three excavated, pure components produced adequate samples of artifacts, three probable components had more limited numbers of artifacts, while eight surface sites are tentatively classified as Little Arm Components. About 1, 200 artifacts have been found of which serrated side scrapers, neatly chipped ovoid plano-convex end scrapers, Plainview, Minto and Milnesand points, Anaktuvuk and Flint Creek burins, lashed antler points and unifacial drills are unique to the Little Arm phase. Artifacts which appeared in the previous horizon but which in combination with the types listed above are diagnostic of the Little Arm phase are blades, keeled end scrapers, Fort Liard burins, Agate Basin points, gravers, and split pebble choppers. Additional diagnostic artifacts are tongue-shaped polyhedral cores, truncated microblades, prismatic microblades and secondary burin spalls. The latter continue into later horizons (Fig. 80). The high proportion of microblades to blades is possibly a characteristic of the phase.

Half the sites are small enough in size to have been occupied by microbands, while the other half seem to have been made by macrobands. Eight of the sites are on obviously good lake-fishing locations, the others are on game trails. The information concerning the fauna and the artifacts and the inferred subsistence activities, suggest that the Little Arm people were nomadic microbands of hunters and trappers during the winter, but during the summer these microbands coalesced into macrobands living near lakes where they subsisted principally upon fish.

Bones uncovered include bear, caribou, buffalo, and moose, also birds, wolf, and other small mammals. The larger animals were obviously hunted with spears or darts tipped by Milnesand, Plainview, and Agate Basin points. The Minto point may also have tipped an arrow. Bifacial knives and scrapers may have been used to butcher the animals, and slab choppers may have been used to break up the bones for marrow. The small mammal bones suggest that the Little Arm people did as much trapping as hunting. Just what the trapping methods were is unknown. Although no fish bones were unearthed, the occurrence of net sinkers, and the location of eight components on the shores of lakes, indicate fishing was an important activity. Furthermore, the net sinkers indicate that gill nets were used. Roasting meat on heated rocks continued to be the common method of cooking.

Flint knapping techniques were much like those of the preceding phase. Net sinkers, choppers, and chi-thos were made by percussion while side scrapers, bifaces, end scrapers, points, and other tools were

made by both percussion and pressure flaking. Burins were manufactured by roughly the same technique as in the Champagne phase, as were blades and conical polyhedral cores. A variant of the latter technique occurred in making microblades. Many of the microblades were struck from tongue-shaped polyhedral cores. These polyhedral cores were fashioned from a flat flake, their narrow edges being fluted as blades were removed. In order to make the fluted narrow edge, the bases were sharpened and possibly set in some sort of groove. Then the striking platform above the narrow fluted edge was struck by direct percussion or by striking a punch placed against the striking platform above the fluted surface.

Methods of skin preparation changed slightly. Skins were probably still removed from the carcass by using serrated scrapers, side scrapers, and bifacial knives. These same tools could have been used as well for cutting up the hides. The skins were also cleaned by hafted end scrapers of a number of varieties, as well as by neatly chipped plano-convex end scrapers held in the hand. Perhaps after this initial scraping, the skins were further worked by scraping them with chi-thos that may not have been hafted to a handle. Once the skins were prepared and cut into their desired forms, they presumably were pierced for sewing with long bone awls, gravers, unifacial drills, or pointed scrapers.

In addition to evidence permitting description of subsistence activities, flint knapping, and clothes making, there is some evidence that there may have been an extensive bone working industry. Burins of a number of types may have been used to cut slots or otherwise to cut bone for handles, shafts, and the like. Certainly the flint drills could have been used to pierce bone, and gravers could have been used to make eyes for bone needles. Unfortunately, preservation of perishable materials was poor in most of our Little Arm sites, and the only actual evidence of a bone industry is a single ground bone awl or point with an obliquely sliced hafting plane.

Some of the flint tools could have also been used to work wood as well as bone, but again evidence is lacking. The one chipped spokeshave-like implement may have been utilized to prepare wooden shafts for darts, lances and other objects, and the serrated scrapers could have served as saws.

The stone net sinkers are possible evidence that there were nets or set lines. If so, these people must also have fabricated some sort of string.

The Gladstone Phase

The Gladstone phase is a transitional stage between the more distinctive Little Arm and Taye Lake phases. In the initial analysis, my thinking fluctuated between splitting it in half and including the early part with Little Arm and the late part with Taye Lake, or including it totally with one or the other, or regarding it as a separate entity. Finally, I

decided on the latter since it fitted relatively poorly with both its ancestor and its descendant. In addition, this transitional culture type was extremely similar to cultural phases or complexes in surrounding areas, such as Pointed Mountain in the Northwest Territory (MacNeish 1954) and the Campus site in Alaska (Rainey 1939).

Zone F1 of the Gladstone site (JhVq-1) and level four of the Little Arm site (JiVs-1) were pure components of the Gladstone phase. Floor two of KfVd-2, JgVp-1, JeVc-1 and JfVg-3, despite more limited samples, were considered probable components, and JjVj-5, JjVi-5, JjVj-3 and JhVf-1 were considered possible components (Fig. 77). The lowest level of Canyon Creek also may be a Gladstone component. As might be expected with a transitonal culture, it has few unique traits, the only one being a unibarbed bilateral antler point (Fig. 80). Some other diagnostic traits are complexes of artifacts which do not appear together as units either before or after. An assemblage which originates in Little Arm and continues into Gladstone includes tongue-shaped and conical polyhedral cores, Fort Liard and artifact burins, net sinkers, chi-thos, truncated microblades, keeled end scrapers and secondary burin spalls. Types that first appear in Gladstone and carry on into Taye Lake or later horizons are Morhiss, Refugio, Anderson, Besant, Destruction, Lockhart, and Taye points, crude plano-convex scrapers, beaver tooth gouges, notched pebbles which may be net sinkers but they have chipped adze-like ends, spokeshaves, and square-based bifaces. Another characteristic of the phase is the equal proportion of blades to microblades.

Although the sample of sites is smaller than that of Little Arm it is sufficient to reveal that the settlement and community patterns were roughly the same. That is, the Gladstone people were nomadic hunting and trapping microbands in the winter coalescing in the summer to form macrobands for fishing in lakes and streams. The sample of bones, although very inadequate, suggests that the trapping of small mammals was more important than big game hunting.

The large notched, stemmed, and leaf-shaped points probably tipped lances or darts which were used to kill the large mammals. The diminished size of some of the smaller Lockhart, Morhiss, Besant, and Anderson points suggests that the bow and arrow may also have been used in hunting. Procedures for butchering animals and roasting meat characteristic of previous phases continued. Cracking of bone for marrow continued, but bifacial choppers were more commonly used than pebble choppers. In spite of the many small animal and bird bones found, there is no direct evidence of trapping. The net sinkers indicate some fish may have been caught in gill nets, while other fish may have been procured with spears tipped by unibarbed, bilateral antler points. Similar fish spears can be used for fishing through the ice.

All the flint knapping techniques of the previous period continued although percussion-made tools were less common. A few blades and microblades were made from the tabular core, a new type, and on some tongue cores the fluted surfaces were used as a striking platform. Pro-

jectile points were often retouched so that they had stems or notches to facilitate new hafting techniques. Working of skins seems to have continued in much the same manner even though new end scraper types appear. The awls and antler fish spear are evidence that there was a bone industry.

Spokeshaves for fashioning arrow and spear shafts and beaver tooth gouges are evidence of woodworking. It is interesting to note that in the ethnological literature, beaver tooth gouges often appear as "crooked knives" and one of the main functions of crooked knives is to gouge out slots in the rims of snowshoes. Did the Gladstone peoples have snowshoes? Some of the net sinkers with blunted ends also could have been used as hafted axe-like or adze-like tools.

I have the feeling that the Gladstone peoples were better adapted to living in the boreal forest than their predecessors in the region. The basis for this hunch is inferred from the chipped adzes possibly for cutting trees; the beaver tooth gouges, possibly for making snowshoes; the small mammal bones that may imply trapping; the net sinkers indicating gill nets; and the barbed fish spear possibly indicating ice fishing. Whether this hypothetical better adaptation to the environment was in response to a recent invasion of the forest, or whether it resulted from a culmination of the development of techniques after long experience in the woods, is difficult to determine on our present evidence.

The Taye Lake Phase

The evidence of this phase in the southwest Yukon is most abundant. There are more artifacts and components than in the other phases. Levels two and three of the Taye Lake site, Floor one of the Pelly Farm site, and the deposit at the Callison site all yielded large numbers of types of artifacts in well-defined archaeological strata. The probable components are level three of JiVs-1, JfVb-7, JfVc-5, JfVb-1, JeVc-4, and JeVc-2. Although the number of artifacts found at each was small, all were found in stratigraphic positions analogous to the "pure" components, that is, in the old humus or soils directly under volcanic ash. Most of the seven floors under the volcanic ash in JfVg-1 did not have enough artifacts to permit them to be definitely classified as Taye Lake. Floors five, six, and ten had a few Taye Lake diagnostic traits, perhaps sufficient to consider the three floors as probable components, but the samples were really not adequate. However, when combined, the artifacts from all of these levels comprise an adequate sample which is definitely Taye Lake. Thirteen other sites were possible components (Fig. 78).

Unique traits for Taye Lake were Whitehorse points, notched scrapers, an antler hammer, and large half-moon side blades. Equally diagnostic were large side scrapers, crude plano-convex end scrapers, chi-thos, spokeshaves, tabular cores, blades, and an abundance of crude bifacial choppers or ovoid knives, and perhaps polished three-quarter grooved adzes (Fig. 80).

Sites are evenly divided between small or medium sized ones found along game trails, and medium to large sized sites located beside lakes or streams. The community pattern seems to be the same as that of Little Arm and Gladstone, although the sites appear to be slightly larger from which a large population may be inferred. Bones from JiVs-1, KfVd-2, and JfVg-1 give evidence supporting this conclusion. All these floors are thin, representing short occupations. All floors cover small areas, indicating an occupation by a small group of people. There were no bird bones suggesting summer occupation, while a number of pieces of antler suggested definite winter occupation. In addition, most bones were those of large animals. In summer, the Taye Lake peoples grouped together into macrobands which were dependent on fishing, trapping and hunting. Level three of JiVs-1 is good evidence for this opinion because its refuse covered a large area and although the deposit is thin it indicates occupation by a macroband for a single season. Net sinkers were present and the site itself was at the edge of a good fishing spot on the lake, bird bones were found, small mammal bones outnumbered those of large mammals. Therefore one infers that these people lived there during the summer, and that they fished, trapped, and hunted large animals.

Lances or darts tipped with notched and stemmed points, as well as bows and arrows, may have been used in hunting. The arrows were probably tipped with Whitehorse points, and perhaps also with small Besant and Lockhart River points. Meat may have been cut up not only with side scrapers, ovoid and square-based bifaces, blades hafted as dagger-like knives, but also with knives made inserting half moon side blades in grooves in wooden hafts. The use of roasting its filled with fire-cracked rock continued.

Evidence for their flint knapping industry is profuse. The majority of tools are, however, cruder and more roughly made than those of previous horizons. Most of the crude bifacial choppers, some of the crude plano-convex end scrapers, thick side scrapers, net sinkers, and ovoid blades are made only by percussion chipping of flint nodules. Both antler and pebble hammers seem to have been used. Projectile points, end scrapers, drills, and some bifaces are made by retouching percussion fashioned "blanks." Most projectile points are notched or stemmed; the ripple flaking technique seems to have gone out of style. The making of polyhedral cores and the resultant blades and microblades was also on the wane. Further, some of the blades were so crudely made that possibly they were not struck from polyhedral cores. Blades far outnumbered microblades, which also are correspondingly crude. Polyhedral cores, however, did exist and are of the conical or tabular type. The burin technique seemed to have been disappearing for only one burin occurred in an excavated component (JiVs-1, level three). Even the provenience of this burin is questionable, for the layer was superimposed on a stratum which contained numerous burins and mixture with materials from Taye Lake deposits is possible.

A few other tools were made by other techniques. The antler hammer,

fibular and split bone awls were made by cutting bone and then grinding it into its final form. Slivers of bone suggest that the cutting was not accomplished by a burin but with thin flint flakes perhaps thin side scrapers. The finding of a three-quarter grooved stone adze, at the surface of a Taye Lake site, suggests that perhaps at this time the technique of grinding and polishing stone tools was beginning.

Leather working seemed to have continued as an important industry. The tools of the trade were the side scraper, and ovoid or square-based bifacial knives for fleshing and cutting the skins. Cleaning hides was accomplished by hafted ovoid, flat-topped or end-of-blade scrapers or by crude plano-convex ones held in the hand. Skins were pierced by chipped drills, fibula awls or split bone awls.

Woodwork also continued, for not only are spokeshaves found but so are polished adzes. The latter implement suggests that heavy woodworking was possible. Perhaps the notched "net sinkers" with worked ends were also used as hafted adzes or axes.

The Aishihik Complex

Early in our survey, we realized that some kind of cultural complex existed in the time period between the well-defined volcanic ash layer and the later Bennett Lake culture in the present humus. At JhVq-1, JfVg-1, JhVf-5, and JiVs-3 layers of refuse existed in this position and we hoped to obtain an adequate sample of artifacts to define such an entity. Unfortunately, we never were successful. Thus this cultural entity is relegated to the status of a complex called Aishihik. It is represented by only ninety-three artifacts found at four probable excavated components, four probable components from survey, and two possible components (Fig. 79). As yet the only recognized diagnostic artifacts are Anderson, Catan, and Aishihik points, three-quarter grooved adzes, thumbnail scrapers and plain antler arrows (Fig. 80). The following reconstruction of the way of life of these people of the Aishihik complex is, therefore, most tentative and is subject to modification when more data becomes available.

The settlement patterns seem to show that Aishihik was much like that of Taye Lake. That is, during the winter these people lived as nomadic hunting microbands, and in summer gathered on shores of lakes to fish. There are, however, two differences which may be significant. Aishihik sites are much smaller and less numerous than those of Taye Lake. Secondly, one is located along the Yukon River and suggests that a new pattern had been added. That is, some macrobands were settling during part of the summer along rivers to catch salmon.

Evidence of their subsistence activities is meager. Some caribou and moose bones are evidence of big game hunting. The Anderson and Aishihik points indicate the lance and dart were still in use, while the Catan points reveal that the bow and arrow was of equal importance.

Bird and rabbit bones from the upper levels of JfVg-1 suggest the use of small game. This may best be done by trapping but other means may have been employed. Net sinkers are evidence of fishing.

In contrast, their flint knapping industry is very different from that of Taye Lake. Manufacture of blades and microblades from polyhedral cores, ripple flaking and the manufacture of burins seems to have ceased. Further, few tools were made exclusively by percussion. Almost all flint tools were made by first roughing them out by percussion flaking, and then pressure retouching them into their final forms. Even with this long-established technique, a new variation seems to have been added. That is, some tools, such as the arrow points, thin side scrapers, the thumbnail and flake end scrapers, were not first made into blanks by percussion flaking. In these cases, a thin flake was selected and made directly into its final form by pressure flaking.

Other industries are only vaguely indicated. Bone awls, antler arrow points, and adzes were ground into shape, as in the preceding complex and skins were prepared in a similar manner. Adzes also indicate some woodworking.

The Bennett Lake Phase

The Bennett Lake phase represents the material culture of the late prehistoric and early historic tribes in the area. The excavation of Zone A of JhVf-4 and level one of JiVs-1 yielded large samples of artifacts from well-defined occupation layers. Small samples came from the humus layer of five other sites while very small samples came from the surface of six sites (Fig. 79). The total number of artifacts of this phase is just under three hundred, but they exhibit many unique traits. These include Stott, Prairie, and Fresno arrow points, copper spear points, antler leisters, unilateral multibarbed antler points, triangular antler points, long bone fleshers, scrapers made from glass or gunflint, small crescentic side blades, long bone skewers, copper awls, copper pins, ground slate, bone tubes, carved paddle-like objects, antler gorges, copper gorges, and copper tinklers. Also diagnostic are thumbnail end scrapers, Catan points, three-quarter grooved adzes, beaver tooth gouges, pebble net sinkers, and chi-thos (Fig. 80).

The settlement pattern is rather different from that of the previous people in the region. Groups seemed to have stayed together as macrobands during most of the year, although in the winter there may have been an occasional hunting microband. In the winter these macrobands, which would have included several families, lived near bodies of water and subsisted by trapping and hunting, and perhaps ice fishing. In the summer, the macrobands certainly did lake fishing and trapping at different locations from their winter camps. Also, the macrobands moved to the rivers or larger streams when the salmon ran.

Moose and caribou bones attest to the fact that there still was some

big game hunting, most of it with bow and arrow. Arrows were tipped with small triangular, notched or unnotched points or long antler points. The copper points and the large triangular antler points suggest that the lance was still used. Birds and small mammal bones show that trapping was still important even though some of them could have been killed by arrows. They continued to fish with gill nets anchored by pebble net sinkers, while other fish, particularly in rivers, were probably speared by leisters or barbed bone spears. A few may have been caught by line fishing.

Flint knapping continued in much the same manner as in the previous Aishihik complex, but still greater emphasis was placed on manufacturing tools by pressure retouching flakes. It is, however, in this period that there is a shift from stone tools to tools made of bone or antler. Projectile points, leisters, fleshers, gorges, and tubes were all cut from bone or antler, and then polished into their final form. Perhaps the thin flake "side scrapers" were used to cut the bone or antler, which was perhaps ground into final form with pebble abraders or ground slate.

Copper working appears for the first time. Copper tinklers were made from nodules of copper that were beaten flat and then rolled. Projectile points were also made from flattened copper nodules that were finally ground into their final form possibly using the pebble abraders. The copper pins, awls, gorges, and other objects seem to have been made by first beating copper nuggets into long, thick bars which were rectangular or square in cross-section. These bars were finally ground to their desired form. It is possible that the copper leisters and fish spears which now are found only in private collections were made in this same manner.

Any study of the ethnographic literature or museum collections of the area reveals that leather working was an important industry. The meager archaeological record gives only glimpses of this industry. In prehistoric times, skinning may have been accomplished with side scrapers, flake skinning knives, ovoid or square-based hafted knives, daggers or knives with inset crescentic side blades. The hides were fleshed by fleshers made by cutting long bones transversely or flint end scrapers set in handles. Final working of the skin was done with chi-thos. Beaming tools or two-handed scrapers made from cannon bones have not yet been found in these sites. Holes were punched in skin by the use of copper or bone awls. They may have sewed with copper needles or pins. Finally, the clothes may have been decorated with conical copper tinklers.

The people worked wood. The delicate work was done with beaver tooth gouges and the heavy work with three-quarter grooved polished adzes. In Level one of JiVs-1 there also were a few pieces of birch bark having scars which indicate that it was cut and sewn. This suggests the manufacture of bark containers.

The single carved paddle, or spoon (?) gives us some insight into their artistic ability. The circles on this spoon were obviously made with a compass, while the lizard-like animals on the side of the spoon are evidence that some artists carved in the round.

CHRONOLOGY, COMPARISON, SPECULATION, AND CONCLUSION CONCERNING THE ARCHAEOLOGY OF NORTHWESTERN NORTH AMERICA AND EASTERN ASIA

THE CHRONOLOGY AND DATING OF THE ARCHAEOLOGICAL MANIFESTATIONS IN THE SOUTHWEST YUKON

As indicated in the previous chapter, various components were found in different strata, one above the other, at five stratified sites. Attempting to date this well-established sequence, however, is another problem. The kinds of evidence that can be brought to bear upon the solution of such a problem may be divided into two classes, evidence for relative dating, and evidence for absolute dating. Each of these kinds of evidence do, of course, confirm the basic stratigraphic sequence. Unfortunately, all our dating information combined does not give exact dates for each of our cultural complexes. Perhaps future investigations will allow for better temporal estimates and ultimately absolute dates. At present, all we have is evidence from relative and absolute dating systems which allows us to estimate the ages of our various cultural units.

Now let us briefly review our stratigraphic cultural sequences (Table 3). At the Pelly Farm site (KfVd-2) superimposed floors four and five of the Champagne phase lay beneath a layer of sterile sand which was capped by floor three which contained Little Arm artifacts. Covering these remains was another stratum of sand overlaid by floor two which included Gladstone tools. This was overlaid by sands capped with a Taye Lake occupation, floor one, at the base of the humus. The excavation of the Little Arm site (JiVs-1) confirmed the later part of the Pelly Farm stratigraphy, for it also had a Taye Lake occupation layer overlying Gladstone materials, which in turn overlay Little Arm materials. This site, however, added a fifth cultural phase to our sequence, for there were Bennett Lake remains in a stratum at the top above those of Taye Lake. Although the eleven floors were each separated by thick strata of sterile sands at the Canyon Creek site (JfVg-1) they added little to our knowledge of the cultural sequence. The lower six or seven floors were possible components of the Taye Lake phase and there was a chance that the lowest one or two floors contained Gladstone materials. If so, this merely confirms the Gladstone-Taye Lake sequence found in the other two excavations. However, above our Taye Lake remains at the Canyon Creek site there were remains of a new and sixth culture complex, Aishihik. Although it and the Bennett Lake components both were stratigraphically above Taye Lake artifacts, their sequential relationship to each other could not be established from the stratigraphy in these three sites. The excavation of the Taye Lake site, JfVb-4, however, solved this problem, for Taye Lake remains were found under an occupational layer which contained not only Bennett Lake tools but also associated historic European trade materials. Since Aishihik was prehistoric, it became obvious that this complex fitted in between Taye Lake and Bennett Lake. Excavation of the Gladstone Creek site, JhVq-1, produced remains of three cultural complexes, one above the other. Kluane complex remains were found in the yellow zone near the bottom of the Kluane silt.

Table 3

Archaeological Components Identified During Survey and Stratigraphic Excavation in Southwestern Yukon

Phase or Complex	Excavated Stratified Sites					Excavated probable or pure components	Probable components, identifiable soil zone	Probable components, no identifiable soil soil zone	Possible components associated with soil zone	Possible components not associated with soil zone	Pure components	Probable components	Possible components	TOTAL COMPONENTS
	JhVq-1 Gladstone Site	KfVd-2 Pelly Farm Site	JiVs-1 Little Arm Site	JfVg-1 Canyon Creek Site	JfVb-4 Taye Lake Site									
Bennett			Level 1-2		Level 1	*JhVf-4* Canyon Creek rapids	*JhVf-9* *JkUs-1* *JbUq-1*	*JjVi-1* KeVd-1	KfVd-3 JdUi-1	JhVf-3 JbUq-5 JbUq-2	2	*5*	6	13
Aishihik	Zone C			Floor 1 Floor 2 Floor 3			*JjVi-3* *JiVs-3* *JhVf-5* *KeVd-2*			JaUe-1 JbUr-1		*4*	6	10
Taye Lake		Floor 1	*Level 3*	Floor 4 *Floor 5* *Floor 6* Floor 7 Floor 8 Floor 9 *Floor 10*	Level 2-3	IeSh-1 (Callision)	JiVs-5 *JfVb-7* *JfVb-5* *JfVb-1* *JeVc-4* *JeVc-2*		JeVc-6	KiVc-1 KkVa-1 KfVb-1 KbVa-1 HjRr-1 JcVa-1 JcUj-1	3	*9*	13	25
Gladstone	Zone F3	*Floor 2*	Level 4	Floor 11?			*JgVp-1* *JeVc-1*	*JfVg-3*	JjVj-5 JjVi-5	JjVj-3 JhVf-1	2	*4*	5	11
Little Arm		*Floor 3*	Level 5			(Minto Lake) KkVa-2 LaVk-2 (Moosehide)	*JeVi-1* *JiVs-2*		JjVi-2 JiVg-1	KeVd-3 KaVa-1 KjTx-1 JjVj-2 JhVh-1 JeVc-5	3	*3*	8	14
Champagne		Floor 4 *Floor 5*					*JeVc-3*	*KfVe-1*	JjVj-4 JiVs-4	JhVf-6 KjTx-3 JqVd-1 JfVg-2 JfVc-2 JbUq-6 JbUq-4	1	*3*	9	13
Kluane	Zone G												1	1
TOTALS	3	5	4	11	2	4	*18*	*4*	9	27	11	*28*	48	87

A Gladstone component was found above these near the top of the reddish brown zone of the Kluane silt. The Gladstone remains were covered by a layer of volcanic ash which was capped by a burned floor including Aishihik tools. This latter sequence, confirmed the Gladstone-Aishihik stratigraphic relationship found at Canyon Creek.

Thus these five excavations provided a good solid sequence of six archaeological phases. From early to late, they were Champagne, Little Arm, Gladstone, Taye Lake, Aishihik and Bennett Lake. The Kluane materials, even though they were under Gladstone remains, did not appear in direct stratigraphic relationship at a site including Little Arm or Champagne components. However, the characteristics of the soil from which its deposition and development can be inferred did show that Kluane was the earliest cultural complex. The Kluane remains appear in the yellow zone of the Kluane silt, and the Champagne and Little Arm materials were found in the reddish brown zone of the Kluane silt, and never in the underlying yellow zone.

Further confirmation of the placement of Kluane as our earliest complex is found in the artifacts trends and seriations (Tables 11 to 24). Kluane has a few artifact types also found in Champagne, but there are few if any in common with Little Arm and Gladstone. However, Champagne has many types common to Little Arm, and Little Arm has many types which are also present in Gladstone. In fact, the artifact descriptions show that the artifact trends and seriations of types confirm our stratigraphic sequence of the seven cultural complexes. Of particular relevance are the seriations and trends in projectile points, blades and microblades, and end scrapers, because these distinctive types have the most adequate samples.

Perhaps the best confirmation of our cultural stratigraphy comes from finding certain cultural materials in stratified or sequential zones in the distinctive Kluane soil profile in the southwest Yukon roughly in the area along the Alaska highway between Champagne and White River (Table 4). The intensive studies of this profile and other characteristics of the soils of the region by Johnson and Raup have yielded information which is useful in dating our cultures. In outline, the profile from the Kluane Lake region is as follows. Overlying the glacial gravels or other basic deposits is a deposit of loess which has been called Kluane silt. This silt has a mature soil profile exhibiting zones which vary in color from reddish brown at the top to yellow to light gray at the bottom. During the present excavation it was divided into two parts. The lower zone was called yellow-green or gray in color and the upper zone was reddish brown. A second layer of wind deposited silt, named Slims river silt by Johnson and Raup, overlies the Kluane silt. This is a fine grained gray silt carrying varying amounts of coarser sand. It can be divided into several discontinuous levels. Slims river silt is often in contact with the Kluane silt. The deposition of the Slims river silt was interrupted by the deposition of a volcanic ash layer. In places, the lower layer of the Slims river silt is not present, or it is very thin and difficult to identify

and so the ash layer appears to lie directly on the reddish brown layer of the Kluane silt. The layer of Slims river silt above the ash varies in thickness and usually includes, on its surface a large proportion of humic material. In fact the surficial layer is often described as a humus layer. Each of the zones in both silt layers contained the sequence of cultural components found in our stratified sites.

At the north end of the Aishihik Lake Basin there is a soil profile described in our field notes. This appears to be identical with the one in the Kluane Lake Basin which is described in detail by Johnson and Raup. Actual comparisons in the field of the two profiles to determine relationship have not been made. However, all of the area about Aishihik Lake above the falls at the southern end lies above the level of the Pleistocene Lake Champagne and it is well above the Hypsithermal Alsek Lakes. It is presumed therefore that the history of Aishihik Lake is analogous to that of Kluane Lake and that the silt deposits are similar. As noted below, the location of artifacts in the silts confirms this assumption (Table 4).

The only cultural materials from the lower yellow zone of the Kluane silts were those belonging to the Kluane complex in Zone G of the Gladstone Creek site (JhVq-1). The next zone, the reddish brown zone of the Kluane silt, contained three kinds of cultural materials Champagne, Little Arm and Gladstone. The components of these three cultural phases, however, appear in rather different stratigraphic positions within this soil. The Champagne components, JiVs-4 and JjVj-4, the five Little Arm components, JiVg-1, JiVs-2, JjVi-2, JjVj-2 and level five of JiVs-1 appeared in the lower part of the reddish brown soils of the Kluane silts. The six Gladstone components, JhVq-2, JjVj-5, JjVi-5, level two of JgVp-1, level four of JiVs-1 and zone F1 of JhVq-1 all were located in the uppermost section of the reddish brown silt. Above these remains, in the lower part of the Slims River silts below the volcanic ash were three components of the Taye Lake phase, JiVs-5, JfVb-7, and level three of JiVs-1. Above the volcanic ash, in the upper part of the Slims River silts but below the humus, were three components of the Aishihik phase, JjVi-3, JiVs-3, and Zone C of JhVq-1. In the overlying humus were five Bennett Lake components, JkUs-1, JhVf-3, JhVf-4, JhVf-9, and level one — two of JiVs-1.

The distribution of sites in the Shakwak and Dezadeash Valleys confirm the sequence of sites found in the Kluane silt. As Johnson and Raup have said, at the time the Kluane silt was being deposited the Shakwak-Dezadeash Valley was filled with a lake up to an elevation of 2, 800 feet above sea level. It is perhaps relevant to note that the sites of the Champagne (JfVg-2 or JfVc-2) Little Arm (JeVi-1 and JeVc-5) and Gladstone (JfVj-3, JhVf-1, and JeVc-1) phases that occur in this valley would be contemporaneous with the formation of the Kluane silt and they are all above the 2, 120 foot elevation. Further, JeVi-1 at mile 1013 is on one of the beaches of this extinct lake. The geological studies of the Andover-Harvard expedition show that Lake Champagne had drained before

Table 4

Correlation of Archaeological Components with the Soil Profile in The Kluane Lake Basin

		Kluane	Champagne	Little Arm	Gladstone	Taye Lake	Aishihik	Bennett Lake
SLIMS RIVER SILT	Humus							JiVs-1, level 1-2 JhVf-4 JhVf-9 JkUs-1 JhVf-3
	Gray silt and sand						JhVq-1, Zone C JiVs-3 JjVi-3	
	Volcanic ash							
	Gray silt and sand					JiVs-1, level 3 JfVb-7 JiVs-5		
KLUANE SILT	Upper Reddish brown zone				JhVq-1, Zone F JiVs-1, level 4 JgVp-1, Test 1 JjVi-5 JjVj-5 JhVq-2			
	Lower Reddish brown zone		JiVs-4 JjVj-4	JiVs-1, level 5 JiVs-2 JiVg-1 JjVi-2 JjVj-2				
	Yellow zone	JhVq-1, Zone G						

the deposition of Slims River silt had begun. At the end of the warm period, following the disappearance of the lake, deposition of Slims River silt commenced and oscillations of climate resulted in the formation and draining of four lakes in the Shakwak Valley. The area in which Taye Lake and Aishihik material was found was not affected by these oscillations. It is significant to note, however, that nine Taye Lake sites (JfVg-1, JeVe-1, JeVc-2, JeVc-4, and JeVc-6, JfVb-1, JfVb-4, JfVb-5, and JfVb-7) three Aishihik components (JfVg-1, "floor" one, two, and three) and one Bennett Lake Site (JfVb-4, level one) are all below the levels of the beach 2120 feet above sea level. In other words, the statement by Johnson and Raup that early sites can only be found above 2120 feet above sea level in the Shakwak Valley is confirmed. This correlation of the distribution of archaeological sites and geological deposits confirms the sequence and is of chronological significance.

The botanical and geological studies of Johnson and Raup, as well as my stratigraphically determined archaeological sequence with associated faunal remains permit a broad and tentative reconstruction of the climatic and geologic history of the southwest Yukon. Following the last major period of glaciation the climate was cooler than the present and much of the vegetation was tundra or grassland. The components of the Kluane complex may belong to this period. Following this there was a period of gradual warming accompanied by drier conditions. The Champagne, Little Arm and Gladstone phases fall within this period. Their associated faunal remains confirm the reconstructed sequence of the climate and vegetation. The muskox, elk, caribou, and bison remains from the earlier Champagne sites are possible evidence of a cooler climate and the dominance of a grassland and tundra vegetation. The disappearance of muskox and elk, the decrease of bison remains, and increase of moose and black bear bones in Little Arm and Gladstone levels indicate increasingly warmer and drier conditions. The many bison and caribou remains tend to show that the area was still predominately grasslands but the steady increase of moose and bear may be an indication that the gallery forest was being gradually extended along the banks of streams. The climax of this period of increasing warmth is the period called the Hypsithermal. During this time the soil profile in the Kluane silt matured so that the artifacts now appear in various colored zones.

The next period saw the expansion of the forests and the beginning of the deposition of the Slims River silts, as well as other geological phenomena marking the end of the Hypsithermal. The dominance of moose bones over those of bison in the Taye Lake remains in the Slims River silts would further reflect the increased forests in the region and also mark the beginning of the development of modern climatic conditions. The only possible break in this period leading to the present climatic, vegetational and faunal assemblage may have been caused by the blanketing of the region by the volcanic ash. Following the volcanic activity the Aishihik and Bennett Lake peoples occupied the area and throughout this time period the present day conditions became increasingly dominant.

These stages based upon geological, zoological, botanical and archaeological data seem to be based upon a firm foundation. Unfortunately, the attaching of absolute dates to these stages is at best tentative and far from satisfactory.

During our excavation in the southwest Yukon, a request for obsidian chips was received from the United States Geological Survey. They were experimenting with a technique to date obsidian by measurement of its rind. Initially, I sent them about ten specimens which they measured (Friedman and Smith 1960, Table I). Since we uncovered thousands of obsidian chips in our excavation, and since the cost of processing was minimal, Dr. Donovan Clark, who carried on the work initiated by Friedman and Smith, and I embarked on a program of obsidian rind dating.

In the field we made a conscious effort to collect obsidian from well-defined strata with good cultural association and with carbon for carbon-14 age determinations. In total we collected about four hundred obsidian specimens associated with twenty-three carbon specimens from twenty-one archaeological components (Table 5). The first measurements by Clark (Clark 1960) of the obsidian from the stratified layers of the Little Arm Site (JiVs-1) yielded very encouraging results. The average thickness of the obsidian rinds of specimens from various levels were: Little Arm component, 2.4; level four, a Gladstone component, 1.9; level three, a Taye Lake component, 1.8; and the Bennett Lake material averaged 1.3. Eventually ninety-four measurements were taken from the obsidian rinds from twenty-one components. Unfortunately the final results were not as consistent as the initial ones. All the results arranged stratigraphically are given in Table 5. The final average measurements are summarized below.

	averages of all specimens by components	averages of averages by components
Bennett Lake	1.23	1.3
Aishihik	2.3	2.3
Taye Lake	2.4	2.04
Gladstone	2.05	2.05
Little Arm	2.36	2.4
Champagne	2.3	2.3
Kluane	3.2	3.2

Concerning these results Dr. Clark wrote: "It will be observed on this basis, that Gladstone appears slightly younger than Taye Lake: otherwise the trend is in good agreement with relative chronology based on archaeological estimates. Tentatively, there is surprising homogeneity on crystallite and micralite composition among intralevel specimens. If nothing else, this would suggest that quarrying habits of the cultures represented by the various levels were consistent with respect to sources of natural obsidian. By the same reasoning, utilization of given quarries

Table 5

Obsidian Rind Measurements from Phases in Various Sites in Southwest Yukon

Cultural Phases and Complexes	SITES													
	JhVq-1	KfVd-2	KkVa-2	LaVk-2	JiVs-1	JhVq-2	JfVg-3	JfVg-1	JeVc-4	JeVc-2	KfVb-1	KeVd-2	JhVf-4	JhUq-1
Bennett Lake					1.1(191a)* 1.3(191b) 1.3(191c) 1.7(192b)								1.5(1926c) 2.1(1927b) 2.1(1927d)	1.1(20-17)
Aishihik								1.8(1912b) 1.9(1913c) 2.0(1912e) 2.1(1913b) 2.2(1912c) 2.2(1911d) 2.2(1911a) 2.3(1913d) 2.3(1913a) 2.3(1911c) 2.4(1913e) 2.4(1912a) 2.4(1911b) 2.7(1912d) 2.8(1911c)				2.4(1925a)		
Taye Lake					1.7(193a) 1.8(193b) 1.8(193d) 2.2(193c)			2.2(1914) 2.3(1915a) 2.6(1915d) 2.7(1915b) 2.7(1915c) 3.0(1916b) 3.1(1916a) 3.2(1916d) 3.5(1916c) 2.5(1918b) 2.6(1918c) 2.6(1918a) 2.6(1917b) 2.6(1917d) 2.7(1917a) 2.8(1917c) 2.9(1918d) 3.2(1919) 2.0(1920c) 2.3(1920b) 2.3(1920e) 3.2(1920d)	2.1(20-12)	2.6(20-14)	1.8(20-13)			

Gladstone	1.9(197b) 2.1(197c) 2.2(197a)				1.8(194f) 1.9(195b) 1.9(194b) 1.9(194c) 2.0(194a) 2.0(194d) 2.1(194e)	2.0(1924c) 2.1(1923d) 2.1(1923c) 2.1(1923a) 2.2(1924b) 2.2(1923e) 2.2(1922d) 2.2(1922a) 2.3(1922b) 2.3(1923b) 2.3(1924a) 2.3(1924d) 2.3(1924e) 2.4(1922e) 2.6(1922c)	2.0(20-16)
Little Arm		1.9(199a) 2.1(199c) 2.5(199b)	2.6(20-9)	2.6(20-10)	2.1(196b) 2.7(196a)		
Champagne		2.2(1928c) 2.3(1928b) 2.4(1929a) 2.4(1929b) 2.4(1929c) 2.6(1928a) 2.0(1930c) 2.3(1930a)					
Kluane	3.2(198a)						

* Numbers in parenthesis are catalogue numbers of specimens measured.

varied from site to site and among the components of each site." This is a most optimistic appraisal of the results, for not only are Gladstone and Taye Lake slightly out of line but so are Champagne and Little Arm, and Aishihik is radically at variance with all the others. A glance at the total measurements reveals that the major discrepancies are associated with Canyon Creek specimens. If one ignored these particular specimens, the resultant component averages would be Kluane 3.2, Champagne 2.3, Little Arm 2.4, Gladstone 2.05, Taye Lake 1.9, and Bennett Lake 1.3. These results are still not perfect, but they are a little more reasonable. Nevertheless, it is difficult to place them in any exact time scale that is valid when correlated with the stratigraphy. Thus, our experiment with obsidian rind dating did not give us dates, although in a general way the results did somewhat confirm our stratigraphic sequence.

Although co-operation with the U. S. Geological Survey did not give us valid obsidian dates, three of the twenty-two carbon samples sent to them were dated by the radiocarbon determination method. The nineteen "other charcoal samples from the S. W. Yukon series were not suitable for C-14 analysis due to excessive rootlet contamination" (Clark 1960). The three samples dated were from the Canyon Creek site and were good solid pieces of wood with no apparent rootlets in them. All were associated with materials classifiable as Taye Lake Phase. The uppermost dated sample was specimen twelve from level three of square nine from the Canyon Creek site. This specimen was fourteen inches below the surface and was lying in the volcanic ash with its bottom-most portion situated in the sand below the volcanic ash. It is assumed that it was a piece of wood lying on the surface of the ground when the volcanic ash was blown onto the site. It was dated as 1770 B.C. ± 300 (W-1122). Culturally it would be within the Taye Lake period but not necessarily at the end of it. Specimen sixteen, was a large log with hair-like roots on its exterior. It was in a hearth area in level seven, square eight, at a depth of 51 inches below the surface. It was dated at 1520 B.C. ± 300 (W-1123). A large number of artifacts were not associated with it. Those from level six above it, and level ten below it, were good Taye Lake types, so there is little reason for believing it is anything but a Taye Lake component. The actual date is somewhat at variance with the one from level three, but considering the range of error using two Sigma, it is valid. A large burned piece of wood was a third sample in a hearth-like area in square ten, level nine at a depth of seventy-four inches from the surface at Canyon Creek. It was dated 2780 B.C. ± 320 (W-1125). The artifacts from level nine and those from level ten are Taye Lake types, although they are very early in the phase. These radiocarbon dates appear to be consistent with the stratigraphy.

The other three dated specimens from the southwest Yukon were much like those which the U. S. Geological Survey considered were "not suitable for C-14 analysis due to excessive rootlet contamination." Parenthetically, I might add that this is true of almost all the carbon I have seen sent in from the North. One specimen was from floor three, square

Table 6

Radiocarbon Dates for the Volcanic Ash and for Four Phases in Three Sites in Southwest Yukon

	KfVd-2	JiVs-1	JfVg-1
Taye Lake			1770 ± 300 B.C. (W-1122) 1520 ± 300 B.C. (W-1123) 2780 ± 320 B.C. (W-1125)
Gladstone		1270 ± 140 B.C. (G.S.C.-126)	
Little Arm	1150 ± 70 B.C. (S.-193)		
Champagne	970 ± 140 B.C. (G.S.C.-127)		

Volcanic Ash	490 ± 180 A.D. (C.-101) 344 ± 180 A.D. (C.-101) 430 ± 100 A.D. (I.-276) 200 ± 110 A.D. (I.-275) 50 ± 250 B.C. (W.-978)

S13W2, a Little Arm component at the Pelly Farm site (KfVd-2). Before it was sent to the University of Saskatchewan, I attempted to remove its rootlets, however, I am no expert in this technique. It was dated at 1150 B.C. ± 70 (S1193). Another specimen from square S20W65, level five, a Champagne component at Pelly Farm (KfVd-2) was sent to the Geological Survey of Canada. It was dated at 970 B.C. ± 140 (G.S.C.-127). The other specimen sent to the Geological Survey of Canada was from S10W105, level four, a Gladstone component, at the Little Arm site (JiVs-1). Its radiocarbon date was 1270 B.C. ± 140 (G.S.C.-126).

Although the volcanic ash did not contain actual archaeological material it was associated stratigraphically with cultural strata. A number of radiocarbon dates may be brought to bear upon the ages of the volcanic ash. Two determinations were made on charcoal in the ash collected by Johnson in 1948. These were made by using the solid carbon method (Libby 1953) and gave dates of 344 and 490 A.D. ± 180 (C-101). Johnson informs me that these dates are most unreliable. The determinations were made early in the period of development of the method. The samples were collected before the radiocarbon dating technique was known and they comprise several small pieces from different locations in the sites. They are not related to the deposition of the ash. More recently peat from the upper Tanana was collected from above and below the volcanic ash (A. T. Fernald, 1962). The peat from just above the ash was dated as A.D. 430 ± 100 (I-276), while two dates of A.D. 200 ± 110 (I-275) and 50 B.C. ± 250 (W-978) were from peat just under the volcanic ash. Taking all these dates into consideration, a date of about A.D. 300 ± 100 for the volcanic ash seems to be reasonable. The archaeological dates are far from reasonable for they are neither consistent with the stratigraphy at individual sites nor are they consistent with the stratigraphically determined archaeological sequence (Table 6).

Can the various geological, floral, and faunal stages and the associated archaeological material be dated by the radiocarbon determinations? Quite frankly, I do not believe those presently available can be used for exact dating of this material from the Yukon, but they may become the basis for speculation about the ages of the cultural phases and stages. There seems to be two possible schemes of dating the remains in the southwest Yukon. They have been called the "long count" and the "short count" (Table 7). For both of the schemes I have assumed that dating of the volcanic ash at 300 A.D. ± 100 is correct and that the Aishihik and Bennett Lake phases as well as modern conditions fall between that date and roughly 1900 A.D.

The short count is based on an assumption that the Carbon 14 dates from Canyon Creek (JfVg-1) and the lowest one from Pelly Farm are all wrong. It places Little Arm before 1200 B.C. and makes Gladstone more recent. The Taye Lake phase ends by 300 A.D. because it is under the volcanic ash. It would have certainly begun well after 1200 B.C., perhaps at about 300 B.C. In this schedule of dating Little Arm can be estimated to begin about 2000 B.C., Champagne begins about 3000 B.C.,

Table 7

Diagram Illustrating Development of Two Estimates of Chronology in Southwest Yukon

	Short Count					Long Count					
	Kluane Profile	Climate	Flora	Fauna	Culture Phases	Culture Phases	Fauna	Flora	Climate	Kluane Profile	
0	Deposition of Slim's River silt including the volcanic ash	Like the present	Rise of modern forests	Modern fauna	Bennett Lake / Aishihik / Taye Lake	Bennett Lake / Aishihik	Modern fauna	Gradual rise of modern forests and loss of grasslands	Gradual development of modern climate	Humus / Slim's River silt deposition	Volcanic Ash 0
1000 B.C.	Erosion and deposition of Kluane silt	Warmer and drier	Grassland with gallery forests	Modern fauna and bison	Gladstone / Little Arm	Taye Lake	Mainly modern fauna but bison present	…	…	Primary deposition of Slim's River silt	1000 B.C.
2000	…	Cooler than present	Grassland and tundra	Bison caribou elk muskox	Champagne	Gladstone	Bison dominant over first modern fauna	Rise of some gallery forests but mainly grassland	Gradually becoming warmer and drier	Reworking of Kluane silt	2000
3000	…	…	…	?	Kluane	…	…	…	…	…	3000
4000	Glacial deposits	Glacial				Little Arm	…	…	…	Deposition of Kluane silt	4000
5000	…					…	…	…	…	…	5000
6000	…					Champagne	Bison caribou elk muskox	Grassland and tundra	Cooler than present	…	6000
7000	…					Kluane		…	…	…	7000
8000	…					…		…	Glacial	Glacial deposits	8000

Kluane begins at 4000 B.C. Criticisms of such a scheme are as follows. One, it assumes that somehow the better samples selected by the U.S.G.S. did not give as good radiocarbon determinations as the more heavily contaminated samples. Two, the attempt to correlate dates on cultural manifestations in the Northwest Territory and British Columbia with those in the Yukon is unsuccessful. Cultural considerations are reason for asserting that the latter are older than the former as has been shown but the radiocarbon dates would make the cultural materials in the Yukon much too young. Three, it compresses a number of major changes in vegetation, geology, fauna, and culture into a brief 4,000 year period. Finally, it dates the hypsithermal in the southwest Yukon between 2000 and 500 B.C. which makes that stage several thousand years younger than it is elsewhere in North America.

In contrast to the above, the long count assumes that the specimens from JfVg-1 are dated more correctly and that other dates were contaminated so that the results appear more recent than they should. This schedule on the basis of two dates (W-1122 and W-1123) places Taye Lake in the period from roughly 300 A.D. to 2000 B.C. Gladstone or very late Taye Lake is dated about 2780 B.C. ± 320. This permits the guess that Gladstone may have begun by 4200 B.C. In this scheme long periods are inferred for each cultural manifestation. Little Arm may have begun about 5500 B.C., Champagne at 6500 B.C. and Kluane perhaps as early as 8000 B.C. The obvious difficulties with this scheme is that each culture phase is unduly long and that the estimates 2000 to 4200 B.C. for Gladstone are hardly in agreement with the date of 320 B.C. ± 75 (S-194) for the related Pointed Mountain materials from near Fort Liard, N.W.T., nor are the dates of Champagne in agreement with the related Great Bear River dates, 2700 B.C. ± 200 (S-9) and 2850 B.C. (S-10). A third consideration is that the samples come from the Canyon Creek site which has been subject to wind action which shifts sand and other materials. Furthermore, the cultural materials are rather meager.

In spite of these difficulties, however, I find myself perferring the "long count." I prefer it because it is, at least in part, based upon the three least contaminated carbon specimens. Secondly, the dates for the Hypsithermal warm-dry period correspond to those of the Little Arm and Gladstone phases, i.e., from 5500 to 2000 B.C. Such dates are in general agreement with the Hypsithermal in the United States. This is assuming that this period in the north is contemporaneous with the hypsithermal in southern sections of the continent. Thirdly, dates on related materials from adjacent regions appear to be more closely comparable to the "long count." Lerma point manifestations including Lerma Points in southern British Columbia are dated at 6200 B.C. ± 400 (S-47) and 7050 B.C. ± 300 (S-97) (Borden 1960). This agrees with the estimate of from 8000 to 6500 B.C. for the Kluane complex which includes Lerma points. Dates on Agate Basin points in the United States range between 4000 and 7000 B.C. and such dates bracket the Agate Basin point bearing Champagne phase. Further, the date of the N. T. Dock complex, 2150

B.C. ± 200 (S-8), which is related to Taye Lake is in agreement with our estimate for the Yukon manifestation as is the date of 459 B.C. ± 160 (S-4) for the related Natalkuz Lake materials in British Columbia (Borden 1952). In spite of this evidence and my preferences, neither scheme truly dates the cultural manifestations of the southwest Yukon.

In spite of the lack of really acceptable dates, however, the basic chronological sequence is soundly based on stratigraphy and correlates extremely well with the results of geological, botanical, and zoological studies. The Kluane complex is the oldest cultural manifestation. It was in existence when the Kluane silts were first being formed and the vegetation consisted of grassland and tundra. The climate was cooler than at present. Champagne appeared only slightly later when the vegetation and geological picture had been only slightly changed by the onset of warming conditions. The Little Arm and the following Gladstone phases were in existence during the onset of the Hypsithermal with its warmer and drier climate. The valleys of the southwest Yukon were still basically covered with grasslands and supporting bison, though moose and black bear began to appear in the wooded areas along the valley streams. Also during this stage the final deposition of Kluane silts and subsequent maturing of the soil profile took place. After the Hypsithermal and during the time of the first formation of the Slims River silts the Taye Lake people occupied the region. The modern forest invaded the area and the buffalo gave way to the moose and other modern fauna. About 300 A.D. volcanic ash blanketed most of the region and later the Aishihik complex and still later the Bennett Lake peoples lived in the southwest Yukon. During this period the modern climate, flora, fauna, and physiography gradually developed.

OBSERVATIONS AND DEFINITIONS PRELIMINARY TO COMPARISON AND SPECULATION

In the previous pages of this report, as well as in the appendix, considerable archaeological information has been presented. Before moving on to the final, truly interpretative section of the monograph, I believe it is worthwhile to pause a moment and look at these data from a critical standpoint. This seems necessary, not only to evaluate the data, but also to determine what should be done in future endeavors in the region -- and this in part involves redefining the problems.

To understand adequately the prehistory of this region, I believe a number of interdisciplinary studies are necessary. Further studies of ethnobotany and ethnology are badly needed. Although preliminary studies of modern flora and fauna have been undertaken, an additional program of paleo-ecology is very necessary. This means studying the recent and pleistocene geology, the pollen, the soil formation, paleoclimatology, and a number of other related fields. Perhaps when such investigations are completed, we will be in a better position to interpret our archaeological information.

The second section of this monograph was concerned with archaeological field work, and although finding one hundred and twenty-nine sites, or components, in the limited field time available compares favorably with other archaeological surveys in northern North America, it is very inadequate. First of all, forty-two of the sites were extremely small, not even having enough artifacts to permit more than tentative classification. Twenty-seven sites had both poor samples of artifacts, as well as no determinable soil zone, nine sites had poor samples but the stratigraphic context of the artifacts was satisfactory, and four other sites had adequate samples of artifacts but no stratigraphic information.

Twenty-five components came from five excavated stratified sites but not all occupations had large samples of tools. It certainly would have been preferable to increase the numbers of artifacts by surveying three or four times as many sites in order to carry to better conclusions the settlement pattern studies, and to correlate cultures more certainly with the soil zones. Although the survey uncovered five stratified sites, which is more than from most regions in the north, it is still not sufficient.

The conclusion that the survey is inadequate is equally true for the number of sites excavated. The five stratified sites with twenty-five components and four single-period sites yielded about 3, 500 artifacts. These, plus the additional 2, 000 artifacts from survey are just not enough to give anything but a tentative sequence, and a tentative classification of artifacts. This, of course, means that when more examples of artifacts are available and when we have more adequately described comparative material in the north, some of my trial types will be changed. The classification of assemblages of artifacts into phases or complexes is there-

fore tentative. For example, the Kluane and Aishihik complexes are very poorly defined, while Bennett Lake and Champagne are only slightly better. Further, while Taye Lake has adequate samples of artifacts, it may cover a long period. Perhaps future work may see it divided into a number of phases. It must also be remembered that for all our cultural complexes a great deal of the material culture is missing, such as bone, wood and other perishable remains. Thus, the meager attempts at reconstructing the way of life of the people represented by the various phases and complexes are woefully inadequate and do not give a complete picture of the culture of these ancient peoples.

It has been indicated that the chronology of the sites and levels in the Yukon is based on good solid stratigraphy which was excavated as carefully as possible. More excavated stratified sites would, of course, be very welcome but even now when compared with other areas in the north this stratigraphic sequence appears to be more reliable than the majority we have to work with. Unfortunately, the dating of this sequence is very inadequate. The number of Carbon 14 samples analyzed is not dependable or sufficient. The obsidian rind calculations, although interesting are hardly reliable, and the age estimates from the recent geological studies of the area are only estimates. The cultural sequence of the southwest Yukon is simply not yet dated, only estimated.

In the following pages, complexes of the southwest Yukon will be compared with each other and with those of surrounding areas. It is my opinion that the various relationships can be more clearly presented by the use of the concept of tradition because it is an "integrative unit" (Willey and Phillips 1958). I have made an earlier attempt to do such for the entire area of northern North America at all time periods (MacNeish 1959). Here I shall confine my efforts to consideration of traditions only in Northwest America. My earlier effort has been described flatteringly as "daring" and "courageous" (Larsen 1961). Quite frankly, even for a more limited part of the region and a more limited time period the gaps in our sequence are so great, the time estimates based on such flimsy evidence, and most of the cultures so poorly known, that I believe my attempts at best should be called "reckless."

By tradition is meant a distinctive way of life, as it is distinguished by an association of artifact types, or diagnostic traits within cultural complexes or phases persisting in time and space. The definition is not new or original. It is roughly the same as the one Irving (Irving 1953) used in originally setting up the Arctic Small Tool Tradition in the north, and the one that Willey and Phillips (Willey and Phillips 1958) used to integrate the archaeological cultures of North and South America.

On the following pages, I hope to demonstrate that it is possible to classify most of the archaeological complexes found in northwest America into seven traditions named British Mountain, Northern Plano, Northwest Microblade, Arctic Small Tool, North Pacific, Inuk, and Denetsiro. Other traditions undoubtedly existed and future investigations will probably define them.

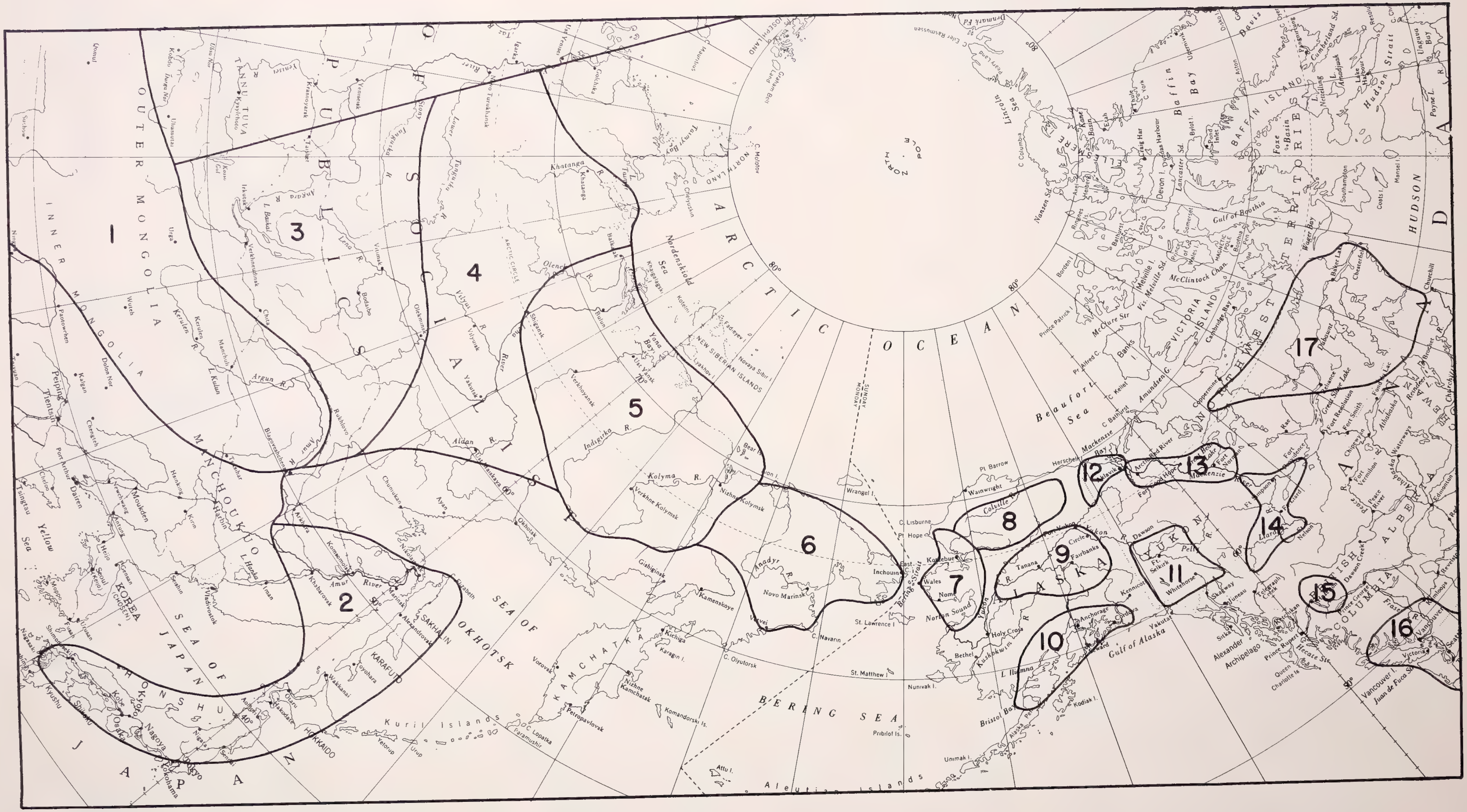
After the prehistoric remains of the Northwest have been organized into traditions, it becomes possible to attack the problem of the peopling of the New World. This means further comparisons, this time between the traditions of the New World with the cultural remains from northeast Asia. Admittedly, the data from all of these areas to be compared is insufficient to reach definite conclusions, but such attempts must be made if we are to understand cultural process in this area, even if only as stimulating working hypotheses.

COMPARISONS IN NORTHWEST AMERICA

In the southwest Yukon, comparisons between the earliest cultural complexes, Kluane and the following Champagne phase, do not lead to definite conclusions because of the limited number of artifacts and traits in Kluane. Of the nine artifact types in the Kluane complex, six of them appear in Champagne, but two of these are types of side scrapers and are widely distributed geographically and chronologically. Furthermore, blades and split pebble choppers which appear in both complexes are common types in the earliest five cultures in the southwest Yukon. Thus, only the pebble chopper appears to be a significant link between Kluane and Champagne. The absence in Champagne of Kluane's Lerma points and scraping planes, and the host of new Champagne traits, far outweigh the evidence of a nexus. Thus, on the basis of the present meager findings there is little evidence of cultural continuity from Kluane to Champagne. This may mean either that they are unrelated or that the connection between them has not yet been found, or just that the sample of Kluane artifact types is inadequate.

Comparisons of Champagne with Little Arm are based on a much larger sample of tools. Significant traits in common are the keeled and end-of-blade scrapers, the artifact and Ford Liard burins, blades struck from polyhedral cores, gravers, and Agate-Basin-like points. Differences are extremely numerous. They include, for Champagne, pebble choppers, rib bone points, Pelly points and a subsistence based on buffalo hunting. In Little Arm, there are many significant traits that are not found in Champagne, such as the microblade and the small polyhedral core complex, chi-thos, net sinkers, burins on microblades and multiburins, unifacial drills, serrated scrapers, new point types, and finally a seasonal economy in part based on lake fishing. Although there is some evidence for cultural continuity, there are sufficient differences to indicate that Little Arm represents a new tradition.

Little Arm, Gladstone, and Taye Lake are all closely linked by a host of traits in common. They are the basis for concluding that these complexes belong to the Northwest Microblade tradition. They all have a similar subsistence pattern, as well as the microblade and small polyhedral core complex, including distinctive tongue-shaped cores. They also made and used larger blades from conical polyhedral cores. Fort Liard burins, burins made on blades or microblades, Agate-Basin-like and Milnesand-like points are present, as are flat-topped end scrapers, chi-thos, net sinkers, split pebble choppers, spokeshaves, bifacial choppers, flake drills, pointed scrapers, numerous bifaces and microblades and blades made into a whole series of tools. Further, there are good link traits between Little Arm and Gladstone, as well as between Gladstone and Taye Lake. Artifact burins, gravers, burin spalls, keeled end scrapers, thick truncated microblades and various kinds of retouched



ARCTIC OCEAN
NORTH POLE
BERING SEA
SEA OF OKHOTSK
SEA OF JAPAN
Yellow Sea
OUTER MONGOLIA
INNER MONGOLIA
MANCHOUKUO
KOREA (CHOSEN)
JAPAN
ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
HUDSON
Beaufort Sea
Gulf of Alaska
KAMCHATKA
SAKHALIN
KARAFUTO
HOKKAIDO
HONSHU
Kuril Islands
Aleutian Islands
TANNU TUVA
SUNDAY
MONDAY
ARCTIC CIRCLE
1
2
3
4
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6
7
8
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Fig. 81. Map of Appropriate Archaeological areas in western America and eastern Asia. 1. North China, Mongolia. 2. Japan and the Mouth of the Amur River. 3. Trans-Baikal. 4. Middle Lena. 5. Lower Lena-Kolyma. 6. Chuckchi Peninsula. 7. Seward Peninsula. 8. Brooks Range. 9. Central Alaska. 10. Southwest Alaska. 11. Southwest Yukon Territory. 12. Northern Yukon Territory. 13. Lower Mackenzie River Valley. 14. Southwest Northwest Territories. 15. Central British Columbia. 16. Southern Cordilleran. 17. Eastern Northwest Territories. Map based on "The Northern Hemisphere" Canada Department of Mines and Resources, Hydrographic and Map Service, Ottawa, 1941.

microblades and variants of tongue-shaped cores are present in Gladstone and Little Arm. Common to Taye Lake and to Gladstone are tabular polyhedral cores, crude plano-convex end scrapers, ovoid end scrapers, beaver tooth gouges, a whole series of notched and stemmed projectile point types, as well as many large crude scrapers and bifacial tools.

Linkages between Taye Lake, the end of the Northwest Microblade tradition in the southwest Yukon, and the Aishihik complex are difficult to evaluate. Many of the specialized Northwest Microblade traits in Taye Lake do not continue into Aishihik. Most of the traits held in common are generalized scraper and biface types, while the new Aishihik traits such as Aishihik points, three-quarter grooved adzes, antler arrows and thumbnail end scrapers appear to be significant differences. Thus, there is only a little evidence of continuity between Taye Lake and Aishihik, and I very much suspect that there is a large temporal gap between the two.

Aishihik and the final Bennett Lake phase, have a few traits in common, but the latter is well represented by many new traits and certainly characterizes still another tradition in the Yukon. Only when more Aishihik sites and artifacts have been uncovered will we be able to determine if Aishihik begins this new tradition.

In summary, Kluane appears unrelated to Champagne. Champagne, while having hints of relationships to Little Arm, is not as closely linked to the latter as are Gladstone and Taye Lake. Taye Lake appears unrelated to Aishihik. There are hints that Aishihik might be in the ancestry of Bennett Lake, which represents still another tradition in our region.

Of all the areas near the southern Yukon, the Mackenzie District supports the largest number of similar cultural complexes. Unfortunately, few artifacts have been discovered and the archaeology has been of preliminary nature. The largest assemblages of artifacts come from the Simpson-Liard region in the southwest part of the Northwest Territories (Fig. 81, Area 14). The sequence is based upon limited excavation revealing stratigraphy in conjunction with seriation and typology. Survey in the area has been superficial, and more investigation is still very necessary (MacNeish 1954).

What seems to be the earliest collection of artifacts was found in an excavation near Johnny Klondike's cabin on a high terrace at the north end of Fisherman's Lake, about twenty miles north of Fort Liard, Northwest Territories. The site (JcRw-3) according to the description I have received, should be next to, or under, the Fisherman's Lake site (JcRw-2) excavated in 1952. (MacNeish 1954). The artifacts were received by mail, with an accompanying note from Gus Kraus of Nahanni Butte, N. W. T. The note states that the tools were given to him, for me, by Johnny Klondike who was one of my employees during the expedition of 1952. Further, the note says that Klondike found them about three feet from the surface, in yellow soil, while digging a pit to use as a cache. When I received the artifacts, yellow loess was adhering to most of them. If the description is correct, and if the stratigraphy is similar to the nearby

Pointed Mountain site (JcRx-2), then they were in the loess zone that was deposited between the last glacial advance in the area, and the time of the post-glacial optimum, when the loess soil profile matured to a more reddish color. Most of the artifacts are made of a blue-black chert similar to those made at Pointed Mountain, but they are much more deeply weathered and patinated.

These artifacts called the "Klondike complex" are worth describing in some detail, even though future excavations may greatly supplement this description. Two of the artifacts are pointed basal fragments of projectile points. The more complete one is eighteen millimeters wide, ten millimeters thick, diamond-shaped in cross-section, and probably was originally about one hundred ten millimeters long. It has rough collateral flaking on its surface, and grinding occurs from the base for thirty-five millimeters along the adjacent edges. These points are similar to those from the Kluane complex and almost identical to ones in the Flint Creek (MacNeish 1959) and the Kayuk complexes (Campbell 1959). One of the points has a small burin blow on the corner of the broken tip extending along one edge. Another large, crude, pointed flake with retouched lateral edges has a burin facet extending along its lateral edge from its pointed end. This is a Fort Liard type, albeit somewhat cruder than most, and it also is present in Flint Creek and Kayuk, as well as in Northwest Microblade cultures in the southwest Yukon. Three flakes with retouching along their edges have chipped graver points. Similar materials occur in Champagne and Little Arm in the Southwest Yukon and in Flint Creek on the Yukon coast. Four large crude blades were found and all have retouching or use-flaking along one or both edges. Similar ones occur in Kluane, Champagne and in the Northwest Microblade phases in the southwest Yukon. Present in the collection was one large thick polyhedral core for making blades, not microblades. It measured sixty millimeters long, forty millimeters wide, twenty-two millimeters thick. Although it is of the conical variety of core, its tip is retouched like the tongue-shaped ones. No identical artifacts have yet been found in the north, but one of the Kluane blades might have come from this type of core. Two fragments of split pebble choppers resemble those in Kluane, Champagne, and Little Arm. Two flakes that may have served as spokeshaves have deep retouched notches on them and are not dissimilar to those in the Northwest Microblade tradition. There were two end scrapers, one, a flake end scraper, and the other, an end-of-blade scraper, as well as two ovoid bifaces, one thick flake side scraper retouched on one edge, six thick flake side scrapers retouched on two edges, two thin flake side scrapers retouched on two edges, and seven thin flakes worked on one edge.

The Klondike complex of the Southwest Northwest Territories (Fig. 81, Area 14) and the Kluane complex seem the most closely related because they had in common similar Lerma points, big crude retouched blades, and pebble choppers. The unique types of artifacts in the Klondike suggest the kind of remains which eventually will be found when more information is available concerning the Kluane complex.

The next complex from the Simpson-Liard region is called Sandy Lake (MacNeish 1954). It is known from two components, both located near Sandy Lake, which is south of Fort Liard. Sandy Lake's chronological position in the sequence is based upon seriation, that is, it has some artifacts like Klondike, and a few others like Pointed Mountain, suggesting it is intermediate between the two. Agate Basin and Pelly points, an artifact burin made on a scraper, crude prismatic blades, end-of-blade scrapers, flat-topped end scrapers, side scrapers and ovoid blades are held in common with Champagne. In fact, the only artifact in the Sandy Lake complex not in Champagne is the Scottsbluff-like point. Many Champagne artifacts do not occur, however, in the limited Sandy Lake complex.

The next complex is Pointed Mountain (MacNeish 1954). The excavation of one site revealed its chronological position, as artifacts were found in the B2 soil horizon, above the Klondike material and below those of Fisherman's Lake and Spence River (MacNeish 1954). Associated carbon has been dated at 320 B.C. 75 (S-194) which because of root contamination may be a minimum date rather than an exact date. The numerous blades, microblades, conical and tongue-shaped cores indicate that it is related to the Northwest Microblade Tradition. The Morhiss and Lockhart River points, however, indicate its closest relationship must be with Gladstone in the Yukon sequence. In addition to these traits in common with Gladstone, it has notched and pointed microblades, Anaktuvuk microblade burins, Fort Liard flake burins and artifact burins, crude plano-convex end scrapers, teardrop-shaped end scrapers, flake end scrapers, and end-of-blade scrapers. The latter were called keeled end scrapers in the Pointed Mountain report. Pointed scrapers, side scrapers, and bifacial choppers were also uncovered. These resemblances indicate that Gladstone and Pointed Mountain are very closely related. There are some differences which prevent them from being classified in the same phase. For example, flake drills, rounded-end microblades, and microblade-like gravers appear only in Pointed Mountain, while many of the projectile point types, net sinkers, beavertooth gouges, antler fish spears and ovoid end scrapers are unique to Gladstone.

The next complex, called Fisherman's Lake, is represented by seven components (MacNeish 1954). One of these components (JcRw-2) at Fisherman's Lake was excavated in front of J. Klondike's cabin about twenty miles north of Fort Liard. The artifacts were found at the bottom of the humus, or at its junction with the A2 soil zone, and of course are above those of Pointed Mountain in the B2 zone. Comparisons with the southwest Yukon indicate that the Fisherman's Lake complex may be closest to the Taye Lake phase. Anderson, Besant, and Refugio points, blades and a few crude microblades, chi-thos, net sinkers, crude plano-convex, flake, teardrop-shaped, end-of-blade and notched end scrapers are held in common, as well as pointed scrapers, bifacial blades and choppers, and many large crude side blades. Again, certain of the Taye Lake traits are absent and the rectangular or square end scrapers of Fisherman's Lake do not appear in Taye Lake. They are both, however,

related and seem to be in the later stages of the Northwest Microblade tradition.

The last complex of the Simpson-Liard region to be mentioned is Spence River. Testing of two components of this complex produced adequate samples of artifacts. The Spence River site (JjRd-2 or site 47) is at the junction of the Spence and Mackenzie Rivers, the other site, numbered JcRw-3, or site 63, is near Fort Liard. This latter site is situated on a low terrace ten feet above the water level, on the northwest shore of Fisherman's Lake, about two hundred yards north of J. Klondike's cabin. In both excavations, the artifacts were found in the present humus. Many of the tools of the complex are like those of the Bennett Lake phase. Prairie and Stott points, thumbnail end scrapers, flat-topped end scrapers, chi-thos, net sinkers, and bone gorges are significant similar traits. Bennett Lake has many other traits not found in Spence River. This difference, however, may be more apparent than real for many of them are of bone or antler and tools of this category were rarely preserved in the Spence River complex. Moreover, there are hints that bone and antler tools are a major component of the Spence River complex, so future investigations in the MacKenzie may reveal that Bennett Lake and Spence River are very closely related.

In summary, it appears that on all time levels, except for that of Little Arm and Aishihik, cultural manifestations similar to those of the Southwest Yukon Territory are to be found in the Simpson-Liard region. The meager Kluane remains of the southwest Yukon appear to be related to Klondike of the Simpson-Liard region, Champagne is similar to Sandy Lake, Gladstone appears to be related to Pointed Mountain, Taye Lake to Fisherman's Lake, and Bennett Lake is possibly related to Spence River (Fig. 82).

Archaeological materials from other parts of the Mackenzie District (Fig. 81, Area 13) are of a more limited nature. From the west end of Great Bear Lake, there is a short sequence of three artifact complexes which were found in stratigraphic excavations (MacNeish 1955). Not many artifacts were found in any of these, and there must be a number of other complexes in the area. The earliest complex, called Franklin Tanks, was found in beach sands with fragements of a mammoth tusk and a rib. The few artifacts found include Plainview points, as well as choppers and scrapers. Unfortunately, the artifacts are so few that it is difficult to establish relationships with the southwest Yukon. The second complex, called Great Bear River, has more artifacts and can be related to Champagne in the southwest Yukon. Two Carbon 14 dates that were rerun yielded dates of 2694 B.C. ± 200 (S-9) and 2854 B.C. ± 200 (S-10). These are probably minimum dates for the Great Bear River artifacts found at the junction of the beach sands and present humus. Similarities between Champagne and Great Bear River include Agate Basin and Pelly Points, crude prismatic blades, end-of-blade scrapers, Fort Liard burins, burin blows on a projectile point, slab choppers, ovoid bifaces, and side scrapers. However, Great Bear River also has similarities to later

complexes in the southwest Yukon. Its Milnesand points occur in Little Arm in the southwest Yukon, while the ovoid or round end scrapers, notched end scrapers, and half-moon side blades occur in Taye Lake. Also, one object, originally called a scraper, is a Denbigh-type burin, and a drill fragment was also found. This data would seem to infer that the Plano tradition lasted into later times in the Great Bear Lake region.

The final part of the sequence at the western end of Great Bear Lake is the N. T. Docks Complex. This was found in the lower part of the humus above the other two complexes and has been dated at 2245 B.C. ± 200, and 2144 B.C. ± 200 (S-8) and 1604 B.C. ± 200 (S-5). One point is a Lockhart side-notched type, another is an Aishihik corner-notched type, originally described as side-notched. (MacNeish 1955, Plate V, top 2). A few microblades of the kind struck from a tabular core fragment were found. There was a piece of flint, not previously noted which may have been a tabular core fragment. There were many more blades than microblades, and many of these were made into end-of-blade scrapers, and two blades were spokeshaves. There was one fragment of a Ford Liard burin, and re-examination of the chips revealed three more. End scrapers are ovoid, keeled, flake and teardrop-shaped. Ovoid and squarebased bifacial knife blades are also present. One of the artifacts originally described as a bifacial chopper is a chi-tho. In addition to the more general kinds of side scrapers, one is pointed. All these traits appear in the Taye Lake phase. I believe N. T. Docks and Taye Lake are related, and represent the final stage of the Northwest Microblade tradition.

Later manifestations were not found in the excavations on Great Bear Lake, though there may be such near the present town of Franklin. The latest materials from the lower Mackenzie are found near Fort McPherson and Arctic Red River and pertain to the Loucheux (MacNeish 1953). These limited samples of materials appear to have some connection with Bennett Lake because of the presence of triangular antler arrow points, long bone fleshers, unilateral multi-barbed points, Stott points, antler leisters, chi-thos, and bone beamers.

Thus, the lower MacKenzie-Great Bear Lake region, in spite of the very superficial work done there, has some relationships to the Yukon. The Great Bear River complex and N. T. Docks Complex appear related to Champagne and Taye Lake, and there are hints that late manifestations in the lower Mackenzie are similar to Bennett Lake in the Yukon (Fig. 82).

Further east in the Northwest Territories, in the Barrenlands, the archaeological picture is even less clear in spite of the fact that Harp, Rousseliere, Irving, Moffatt, Giddings and I have made brief visits to the region (Fig. 81, Area 17). Seriation and correlation of sites with terraces comprises the basis for the sequence. Unfortunately, although the number of sites discovered is quite large, the number or artifacts from each is limited and the amount of excavation is even less. I shall continue to use my original complex designations (MacNeish 1951), ex-

cepting one case, although much of the information is drawn from the analysis of Harp (Harp 1959, 1961). In addition, I shall add the Arctic Small Tool materials found by Giddings (Giddings 1956), Harp and Rousseliere (Collections in the National Museum of Canada).

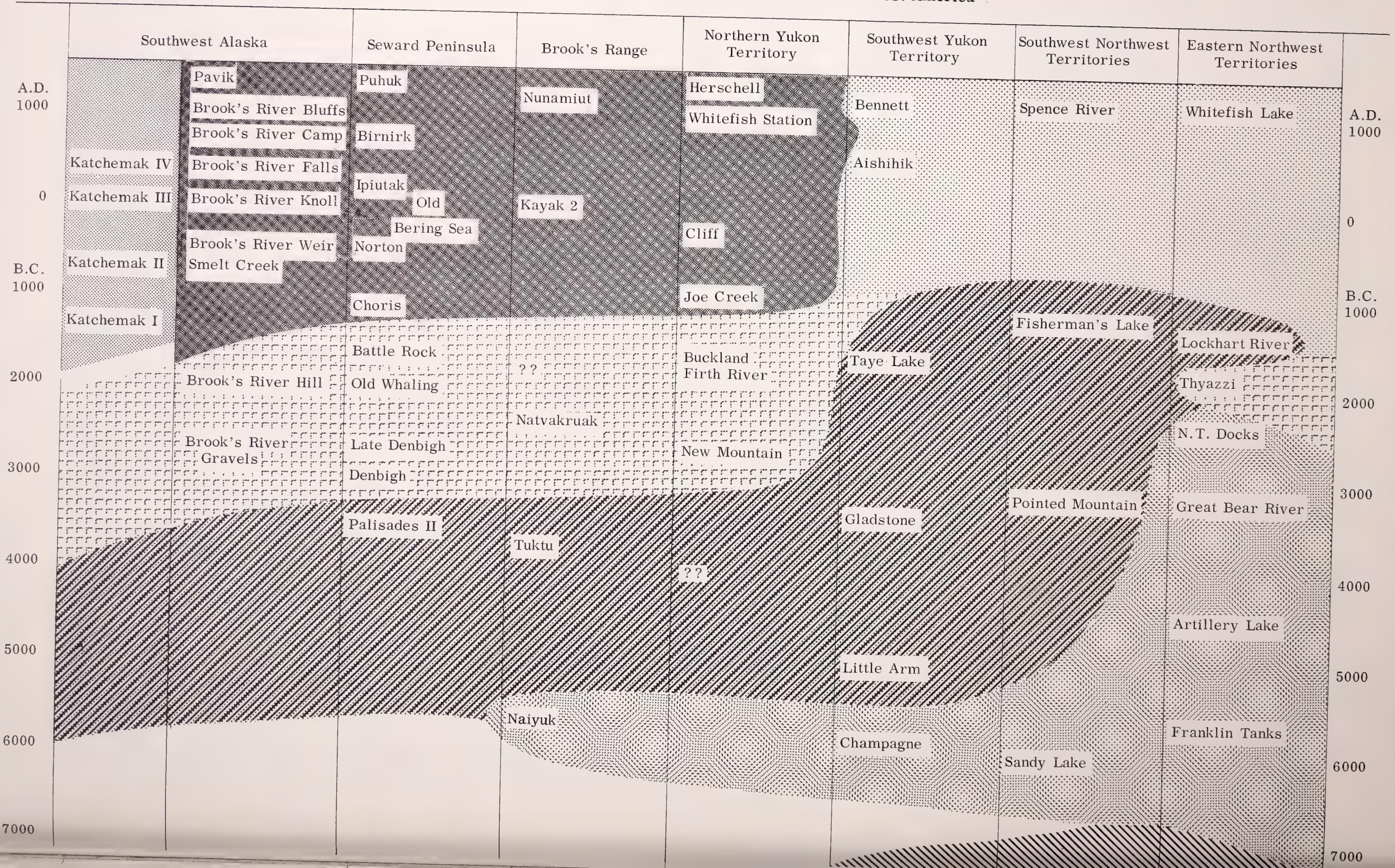
One of the earliest complexes, called Taltheilei, is represented by a very small number of artifacts. There is little resemblance to anything in the southwest Yukon. The next earlier complex, called Artillery Lake (Complex B or Phase I, Harp 1961) is, however, known from a number of sites and somewhat resembles Champagne. Agate Basin points, called Keewatin points by Harp, Pelly points, end-of-blade scrapers, crude prismatic blades, Fort Liard burins, burins made on broken projectile points, teardrop end scrapers, ovoid bifacial knives, flake end scrapers, side scrapers and split pebble choppers, called spall scrapers by Harp appear in both the Champagne and Artillery Lake complexes. The chipped picks, semi-lunar large side blades, large leaf-shaped side blades, and discoidal knives present in Artillery Lake distinguish it from Champagne. Unique tools in Champagne such as gravers, rib bone points and other tools are not found in Artillery Lake complex. The similarities, however, outweigh the differences, and I prefer to place them in the same Northern Plano tradition even though the Artillery Lake complex may be somewhat later and may have lasted longer than Champagne.

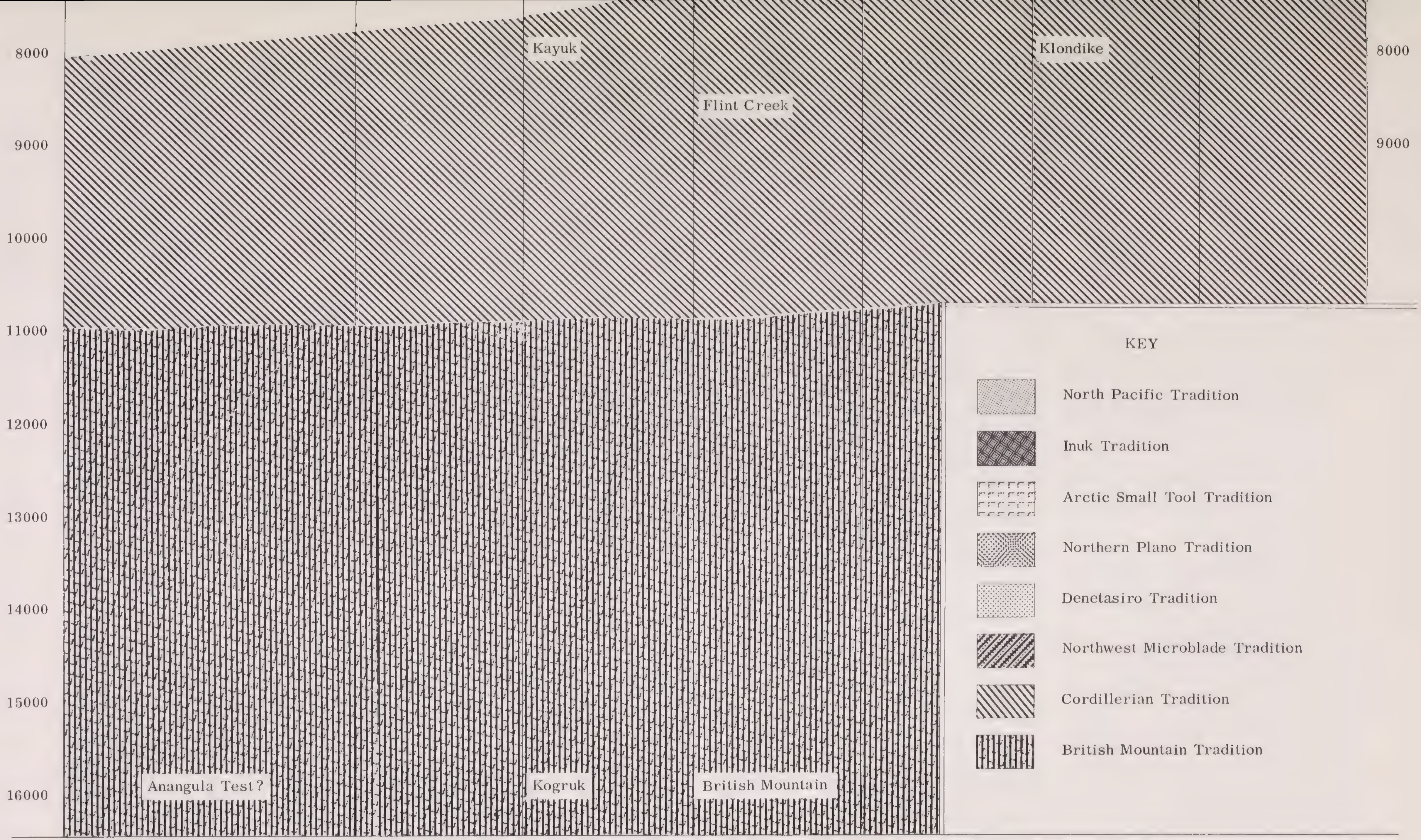
Another complex in the Barrenlands, usually within the Arctic drainage, is one I call Thyazzi. It is called Phase II or complex A by Harp (1961) and Giddings (1956). Its small end blades, burin spalls, microblades which are not numerous, side blades and multi-spalled Cape Denbigh burins suggest it is related to other components of the Arctic Small Tool tradition. Few of its tools are similar to those of the southwest Yukon, except for generalized ones and for microblades which are struck from different core types than the Yukon ones. Although this complex probably follows Artillery Lake, its chronological position is not well determined. Harp places it second in his sequence, but there is little evidence it precedes the Lockhart River complex (Harp's Phase III or Complex C, Harp 1961) and it could follow it. The two also may be in part contemporaneous with Thyazzi, oriented toward Hudson Bay and/or the Hudson Bay drainage, the Lockhart River being oriented inland.

The Lockhart River Complex does, however, seem to be related to Taye Lake in the Yukon. In common with Taye Lake are such elements as Besant, Lockhart, Morhiss, Refugio, and Aishihik points, many large crude prismatic blades, and a few microblades, chi-thos, net sinkers, asymmetrical bifacial knives or large side blades, teardrop flat-topped end scrapers, crude plano-convex end scrapers, notched end scrapers, end-of-blade scrapers, many ovoid bifacial knives or choppers, and pebble hammerstones. Burins are rare, and when found they are either of the Denbigh or Fort Liard types. Harp (1961) has, however, pointed out that Lockhart River does seem to have some relationship to the

Figure 82

A Tentative Sequence of Archaeological Traditions in Northwest America




8000
9000
10000
11000
12000
13000
14000
15000
16000
Kayuk
Klondike
Flint Creek
Anangula Test?
Kogruk
British Mountain
KEY
North Pacific Tradition
Inuk Tradition
Arctic Small Tool Tradition
Northern Plano Tradition
Denetasiro Tradition
Northwest Microblade Tradition
Cordillerian Tradition
British Mountain Tradition

Archaic of the eastern woodlands and to the late pre-ceramic of Manitoba and Saskatchewan. Lockhart projectile points certainly favor this interpretation. I, however, interpret the data as indicating that Lockhart is an attenuated form of the Northwest Microblade Tradition which has been subject to influences from the Archaic to the south. The evidence for either hypothesis is not at present conclusive, and further work may well reverse my hypothesis.

Harp's later Phase IV (Complex D) and Phase V in the Barrenlands seem to be of Eskimo origin and are little related to the Yukon. Evidently, the Whitefish Lake complex (MacNeish 1951) further to the east is contemporaneous with them. It is so inadequately known that few comparisons may be made, although its triangular and side-notched points are similar to those of Bennett Lake in the Yukon.

In summary, then, the eastern part of the Northwest Territories shows only resemblances to our Yukon complexes in the Artillery Lake and Lockhart River horizons. Both of these seem to be later than similar materials from the Yukon (Fig. 82).

South of the Yukon is the vast mountainous interior of northern British Columbia. Unfortunately there is little survey, no excavation except the Callison site (MacNeish 1960) and no analysis of the limited materials is known. Collections made by Leechman make one suspect that it is closely related to the Yukon, because microblades and polyhedral cores, Lerma points, Besant points, and many other Yukon types are found. However, relationships cannot be determined until more investigations have been undertaken. About the same may be said for central British Columbia, except for the investigations of Borden in the Tweedsmuir Park region (Borden 1952) (Fig. 81, Area 15). At the Chinlac village, Carrier historic materials were found superimposed on the remains of an earlier complex which I shall call Natalkuz. These lower materials, dated 459 B. C. ± 160 (S-4), contain microblades, conical cores, many large crude prismatic blades, bifacial choppers, ovoid bifacial blades, and Aishihik and Refugio points. All of these might be found in a Taye Lake site. It must be added that most of the Natalkuz artifacts were unearthed from a large pit house, the like of which has not been found in the Yukon.

The overlying Carrier materials, to a lesser degree, resemble the Bennett Lake materials. Although there are many differences, the Prairie and Stott points, the flat-topped and thumbnail end scrapers, the chithos and bone or antler points hint at a nexus.

Still further south, in British Columbia, Idaho, Washington, and Oregon, there are reminders of relationships to the Yukon. Sites with microblades and cores have been reported, but unfortunately they are not sufficiently well known to compare with those of the Yukon. On a somewhat earlier level are sites which have been classified into the Old Cordilleran culture (Butler 1961) (Fig. 81, Area 16). These include a number in Idaho (Butler 1961), the Lind Coulee site in Washington (Daugherty 1956), the Five Mile Rapids site near the Dalles, Oregon (Cressman 1960)

and the Fraser Canyon site (DjRi-3) in southern British Columbia (Borden 1961). Like the Kluane complex in the southwest Yukon, they have Lerma-like points (called Cascade points by Butler 1961), scraping planes, crude blades struck from semi-conical polyhedral cores, pebble choppers, and split pebble choppers. Further, they have many of the traits of Flint Creek in the north, such as flake burins, needles, leisters, and multi-burins. Thus, there are strong suggestions of relationships at this time period from the Yukon southward through the Rockies. Unfortunately, insufficient work or analysis has been undertaken to assess them properly.

Perhaps, the area that is most closely related to the southwest Yukon is central interior Alaska (Fig. 81, Area 9). Preliminary surveys by Johnson, de Laguna, Rainey, Skarland, Hibben, Hrdlicka, Giddings, Irving, and others indicate that the region has great archaeological potential. It is the key area for information concerning many problems involved in the peopling of the New World. Three excavations have been undertaken, a large number of sites are known, many artifacts have been found and the area has been transversed by more archaeologists than any region in the Arctic. In spite of this, we know almost nothing about the sequence of culture or the kinds of prehistoric cultural complexes existing in central Alaska.

Nevertheless, comparisons of the remains in Central Alaska with those from the southwest Yukon do indicate that the areas were closely related. The comparisons also supply clues as to what the central Alaskan sequence may have been. Indications that early remains similar to the Kluane complex exist in central Alaska come from Rainey's work near Rampart Rapids, Alaska. Here Rainey found two hearths and a few artifacts in the Yukon River bank at a depth of from "three to four meters below the surface" (Rainey 1939: 378). The artifacts consist of a small Lerma-like point, two bifaces, one of which may have burin-like blows on it, a whetstone, side scrapers, and a few crude retouched prismatic blades. The similarities to what little we know of the Kluane complex are obvious.Materials and points similar to the Champagne complex are widespread in Alaska and apparently have often been found in the mucks during gold-mining operations (Rainey 1940). They also appear in the blowouts along the Denali highway (Skarland and Keim 1958). Little Arm materials have not been noted at any site, with the possible exception of the collections from Giddings' backyard located behind their former house on Rainey ridge, at the University of Alaska. Here, Mrs. Giddings recovered a Milnesand-like point, and later Skarland recovered some microblades from the same area (Skarland and Giddings 1948).

Similarities to the Gladstone phase are to be found in the Campus site (Rainey 1939). These include Refugio, Lockhart, Agate Basin, and Morhiss points, tongue and conical cores, microblades and blades which are retouched in a variety of ways, Fort Liard burins, chi-thos, ovoid bifaces, biface choppers, side scrapers, teardrop end-of-blade, flake and keeled end scrapers, and crude plano-convex end scrapers. The

neatly chipped plano-convex end scraper type of the Campus site is more similar to those in Little Arm, while the half-moon large bifacial side blades are similar to those of Taye Lake. The Campus site lacks a number of the Gladstone tools, but be that as it may, the Gladstone and Campus sites are very closely related.

The Taye Lake materials are similar to those excavated by Irving at the Tyone site. There are in common chi-thos, conical cores, blades outnumbering microblades, flat-topped teardrop and flake end scrapers, Agate Basin-like points, Aishihik points, Anderson points, Besant points, end-of-blade scrapers and side scrapers (Irving 1957). Unfortunately, there is some chance that the Tyone complex may have more than one component. The limited materials from Birch Lake (Skarland and Giddings 1948) also seem to be like Taye Lake.

On a more recent horizon are the sites de Laguna (de Laguna 1947) and Rainey (Rainey 1939) found on the Tanana and lower Yukon. Of these, the Dixthada site, excavated by Rainey (Rainey 1939: 364-71), shows definite relationships to Bennett Lake in the Yukon. Resemblances include copper pins, awls, projectile points, and copper gorges, antler unilateral multi-barbed points, leisters and triangular points, Stott and Catan points, beaver tooth gouges, leg bone awls or skewers, long bone fleshers, bone tubes, flat-topped and thumbnail end scrapers, chi-thos, adzes, abrading stones, net sinkers, three-quarter grooved adzes, and other more general traits.

All in all, there are intimations that the central Alaska region is archaeologically closely related to the southwest Yukon, and might well have been in the same culture area for a long period of time. A good archaeological program would place these indicated relationships on a much firmer foundation.

As close in miles to the southwest Yukon as central Alaska, is the northern Yukon, within the Arctic drainage (Fig. 81, Area 12). The few archaeological manifestations uncovered so far are not similar to those to the south. This lack of similarity may in part be due to the fact that archaeological investigation has been very superficial. Only one brief survey has been made along the Yukon Arctic coast (MacNeish 1956a) and a single six hundred mile hike has been made down the Firth River bringing to light only twenty-four sites (MacNeish 1959a). A few of the sites found in the survey have been tested, but only one major excavation has been undertaken at Engigstciak (MacNeish 1959a). This site has complex stratigraphic problems due to solifluction, frost cracks, permafrost, and other Arctic soil phenomena (MacKay, Matthews, and MacNeish 1960).

In spite of these difficulties, it has been possible to establish a tentative sequence of nine cultural complexes. This sequence is based upon some good stratigraphy, some seriation, and some typology. The good stratigraphy was seen in a section of the site called the buffalo pit (Pit 24) where there was little or no congeliburbation (MacKay, Matthews, and MacNeish 1960: 36-37, 48). Here two chips of the British Mountain type

lay on the top layer of gray clay. Over these chips were several feet of stratified sands, and in the two uppermost layers of these sands which were lensed were about one hundred artifacts belonging to the Flint Creek complex. This is probably evidence of two components of slightly different ages. On top of the lensed sands were about two hundred artifacts in humic or lensed sands belonging to New Mountain complex. Intruding into these sands were darker humic, slightly solifluxed soils, containing artifacts of the Firth River complex. In the overlying humus there were Eskimo artifacts.

Although the number of artifacts from each layer was inadequate, the stratigraphy was undisturbed, and this column was the basis for the sequence. Four other artifact complexes, three of which were found at other sites have been placed in their chronological position in the sequence by seriation and typological considerations. Actually, a large number of artifacts have been found at Engigstciak, but most of them were found in the frost-disturbed part of the site, and so the definition of the complexes is not as clear as might be desired. Since we dug the site in successive seasons, and re-analyzed the materials, certain traits and artifacts assigned to one complex have been reassigned to other complexes (MacNeish 1956a and 1959a illustrations). Additional excavations and analyses may improve the definitions of these complexes. At present some of them are inadequately understood. It is also apparent that there are temporal gaps in the sequence, probably larger than the periods represented by the artifact complexes.

The earliest complex at Engigstciak is called British Mountain. Although one "pure" deeply buried site (NhVl-2) which included a few artifacts (MacNeish 1959a) was discovered in the reconnaissance, and although two chips were found on top of the clays under the buffalo pit at Engigstciak, most of the remains came from thirteen patches in the badly frost-heaved portion of the site. Unfortunately, this latter area is the place where the complex was first recognized and upon additional analysis some if its diagnostic traits have been changed (MacNeish 1956a, Plate I; MacNeish 1959a, Plate I). The complex is not well defined as yet, nor has it been excavated in definitive stratigraphic context. Be that as it may, the majority of the tools were made from flakes struck from discoidal cores and most were unifacial. These types bear little resemblance to any assemblage of artifacts we have found in the southwest Yukon. Pebble choppers, ovoid bifaces, crude blades, and plain flake side scrapers do, of course, occur in the southern Yukon, but these are very generalized tools, and all are minor British Mountain traits.

Following British Mountain is Flint Creek in the Firth River region and there is evidently a lengthy temporal gap between the two. As mentioned previously, the best contextual Flint Creek materials came from two strata of sand in the buffalo pit. All the artifact types of the Kluane complex, except for the pebble choppers, were found in these Flint Creek deposits and included Lerma-like points, split pebble, or slab choppers, prismatic and truncated blades, microblades, scraper planes,

and side scrapers. This would seem to indicate that the two are related, even though the Flint Creek deposits in the buffalo pit contained many other artifacts, such as needles, gravers, Flint Creek multi-burins, Fort Liard flake burins, a leister fragment, pebble hammers, sinew stones, pebble pendants, end-of-blade and side scrapers, teardrop-shaped bifaces, bifacial choppers, and two crude triangular points, one of which is reminiscent of Agate Basin. These points and the microblades were in the uppermost sand deposits, and seem to be late additions to the Flint Creek complex. The other Flint Creek components were found under poorer contextual situations and are assigned to the complex with reservations. Four sites (NbV0-1, NiVk-6, NdVo-2, and NdVo-4), with small samples found during survey were tentatively assigned to this complex. Another site (NdVo-3) in the upper reaches of the Firth River was tested during the survey. It contained a larger number of artifacts, but the occupational level was badly frost heaved. The other three tentative components were found in the solifluxed portion at Engigstciak. Most of these tentative components appear to be similar to the latest material in the buffalo pit because they have microblades and Agate Basin-like points. They also have a few other traits not found in the buffalo pit, such as Milnesand-like and Plainview-like points, bone or antler awls, antler gorges, spatula-like antler tools, large snub-nosed end scrapers, and a tongue-shaped polyhedral core. These later Flint Creek materials have similar traits to Little Arm of the southwest Yukon. However, there are many trait differences and the late Flint Creek is poorly defined because of its poor contextual situation, so I do not believe that there is evidence of a relationship between the northern and southern Yukon at this time period. In fact, there seems to be a gap in the Firth River sequence during the time that Plano, Little Arm and perhaps Gladstone existed further south. During the summer of 1962, a field party of Geological Survey of Canada looted a small site near the headwaters of the Babbage River. The stemmed points, end scrapers, polyhedral cores, microblades, blades, and flake burins which were shown to me, appear to belong to yet another complex which might occupy the gap between Flint Creek and New Mountain. It is hoped that the undisturbed parts of the site may be investigated in the future.

Following the gap in the sequence of the Firth River is the New Mountain complex. Stratigraphically, a component of this complex was over Flint Creek remains in the buffalo pit. Four separate components (NoVo-1, NiVk-7, NgVn-4, and NdVo-1) were found during the reconnaissance, and many locations producing these types of tools were noted in the frost-heaved section of Engigstciak. Although the New Mountain complex has blades, microblades, polyhedral cores, and Fort Liard burins as do some of the southwest Yukon phases, the Denbigh type burins, burin spall tools, side blades, small end blades, and many other traits indicate that it is not related to the south. Its closest affiliations are with components of the Arctic Small Tool tradition which extends from Cape Denbigh, Alaska, or even from Siberia, to Greenland. The

more poorly defined Firth River, Buckland Hills, and Joe Creek phases of the Firth River seem to be developments from New Mountain and have similar affiliations. The final phases of the northern Yukon area are Cliff, Whitefish Station, and Herschel and they correspond to phases usually considered Eskimo.

In summary, it appears that, except for Flint Creek and Kluane, the southwest and north Yukon show few cultural relationships (Fig. 82). Some of this lack of relationship may, of course, be due to the fact that work accomplished to date on the Firth River has been preliminary. In addition, there are many gaps in the sequence and many of its cultural complexes are poorly defined. However, as will be indicated in the following pages, relationships between the southwest Yukon and other areas in the Arctic drainage are also tenuous.

The next region to be compared with the southwest Yukon is also in an Arctic environment. It is the Brooks Range (Fig. 81, Area 8) the archaeology of which like that of the Firth River, is still in its infancy. Comparisons of the artifact complexes found in the Brooks Range of Alaska with those of the southwest Yukon are not too conclusive for a number of reasons. First of all, the two areas are not close geographically, secondly, the intervening areas are very little known and, thirdly, their environments at present, are very different. There is, of course, the possibility that the environment in the past may have been more similar, but the necessary paleoecological studies have not been made. The greatest difficulty, however, is the fact that the sequence in the Brooks Range is not based upon either stratigraphy or seriation, but only upon typology and comparisons with adjacent areas, mainly the Firth River. Another factor is that the definitions of cultural complexes in the Brooks Range are based upon artifacts from either the surface or from shallow deposits. Many of these sites are spatially relatively close. All of this, of course, means that it is possible that artifacts from one complex have been mixed with those of another. Be this as it may, a large number of artifacts from many different sites have been recovered and very different congeries of stone tools do seem to exist.

Apparently, the earliest materials from the Brooks Range have been found at the Kogruk site (Campbell 1961) and at the Kataktuvak Lookout site of Solecki. This earliest complex, which I shall call Kogruk, is characterized by a quantity of retouched or utilized flakes struck from discoidal cores. These flakes, usually with a small part of the prepared striking platform adhering, have a variety of forms and all have retouching either on all edges of one surface, or on one edge at the end, or on either the dorsal or ventral surfaces, or on two edges (adjacent or opposite), or on either or both surfaces. A few of these flakes have deep notches, and may have served as spokeshaves, while others are long, leaf-shaped, and retouched to a point, and might have served as projectile points. There are a few utilized flakes, practically side scrapers, which do not seem to have been struck from discoidal cores. Associated with all these materials are a few crude blade-like flakes possibly struck

from polyhedral cores, and end-of-blade scrapers. There are also a few crude bifacial blades, some pebble choppers and fragments of discoidal cores. At Kataktuvak two scraping-plane-like objects or unifacial choppers were made from split pebbles. Excepting the artifacts from Kataktuvak, all these objects can be duplicated in the nearby British Mountain complex of the Firth River. In spite of the fact that British Mountain types of multi-burins, fluted bifaces, hooked flakes, and finer unifacial lanceolate points made from prepared flakes do not occur in Kogruk, the resemblances are sufficiently great to justify considering them as "of the same tradition." As yet the units of the tradition are not well defined, nor have they been dated relatively or absolutely. With the possible exception of a pebble chopper and two flakes with prepared striking platforms from the surface of LbVl-1, which even I don't dare set up as a cultural entity, materials of this tradition have not been found in the southwest Yukon. I would also hazard a guess that the British Mountain tradition is considerably earlier than anything we have found in the southwest Yukon.

Our earliest material in the southwest Yukon, the poorly defined Kluane complex, has only a little resemblance to any complex in the Brooks Range. As has been pointed out previously, Kluane does seem to be distantly related to Flint Creek of the Firth River. Flint Creek, in turn, has some resemblance to Kayuk of the Brooks Range (Campbell 1959). Both these similarities are stronger than those in Kluane and Kayuk since all that they have in common are Lerma-like points (most of the Kayuk ones being more neatly chipped) crude blades, ovoid bifaces and side scrapers. Let me also hasten to add that at the Kayuk site there was some mixture with obviously later (Ipiutak-like?) materials and that the site's chronological position is not well understood. Fortunately, W. Irving's 1962 archaeological survey of the Noatuk Valley in the western Brooks Range has yielded a number of new sites. Some of the collections from some of these sites suggest that some components belong to the Cordilleran tradition and are related to Kayuk. There is hope that the Kayuk complex may become better defined through the excavation of the Noatuk River sites which should disclose artifacts in good archaeological context.

At present, we do not know for sure whether Kayuk comes before or after a complex that Campbell is calling Naiyuk. The Naiyuk complex is, however, better defined in the Brooks Range and it does have definite relationships to the Champagne complex of the southwest Yukon. Common to both are: Agate Basin and Pelly points, burins made on end scrapers and perhaps burins made on broken projectile points, Fort Liard burins, large crude blades, end-of-blade scrapers, flake, keeled, and flat-topped end scrapers, crude blades struck from polyhedral cores, and large prismatic blades retouched on two sides. More general traits shared include scrapers, ovoid bifaces, and bifacial choppers. In contrast to these similarities there are some obvious differences. Naiyuk, for example, has end scrapers with graver-like projections, well-made pointed side

scrapers, beautifully chipped large prismatic blades which are retouched on all edges, and a few crude plano-convex end scrapers. Champagne has gravers, fibula awls, rib bone points and slab and pebble choppers. I consider that these two closely related complexes belong to the Northern Plano tradition.

The Gladstone complex is the next one in the sequence of the southwest Yukon that has resemblances to the sequence of the Brooks Range, namely to the Tuktu complex (Campbell 1961a). The complexes have in common a number of very specific traits including net sinkers with retouched ends, perhaps used as adzes or axes, conical and tabular polyhedral cores, and about an equal proportion of blades and microblades, Refugio, Besant, Lockhart, Anderson, Morhiss, and Agate Basin projectile points, a few artifact burins, crude plano-convex end scrapers, square-based bifaces, plain net sinkers, and abraders. Also in common were pebble and bifacial choppers and the following types of scrapers: pointed, side, end-of-blade, keeled, and flat-topped.

The only traits in Tuktu not in Gladstone are large bifacial side blades, like Taye Lake, and small side blades. Tongue cores, Destruction and Taye points, chi-thos, and a few other traits are found only in Gladstone. In fact, Tuktu and Gladstone are very similar but they cannot quite be classified in the same phase. There is little doubt that both belong to the Northwest Microblade tradition.

The Natvakruak complex (Irving 1953, 1962) which probably follows the Tuktu materials, has little relationship to complexes in the southwest Yukon, though it is related to the New Mountain, on the Firth River and Denbigh-like materials in the Kotzebue region. In fact, all three complexes are in the Arctic Small Tool tradition. I said that Natvakruak probably follows Tuktu but I feel very uncertain about this statement. I have changed my mind several times. Since there are no dates, or stratigraphy, it is difficult to decide which has temporal priority. My present decision is based on three factors. First, the obsidian hydration measurements on tools in Tuktu are slightly thicker than measurements for tools of the Natvakruak complex in the Arctic Small Tool tradition. Second, neither in the Kotzebue, nor in the Firth River sequence is it possible, by seriation, to fit the Tuktu site into the middle of the development of the Arctic Small Tool tradition. Third, there is some evidence that Palisades is before Denbigh in the Kotzebue area, and that Tuktu is very like Palisades, while Natvakruak is like late Denbigh. Finally, the dates I am assigning to New Mountain and other Arctic Small Tool tradition assemblages seem to be later than the tentative dates for the middle part of the Northwest Microblade tradition which had earlier beginnings. In this way it may be suggested that Tuktu is earlier than Natvakruak, even though the interval of time between them may have been of short duration.

The later complexes in the Brooks Range seem to be related to Eskimo remains (Irving 1962) and are little connected with anything in the southern Yukon.

To sum up these comparisons between complexes of the southwest Yukon and those of the Brooks Range, there do seem to have been relationships between the southwest Yukon and Brooks Range of Alaska during certain relatively early periods (Fig. 83). The earliest relationship between Kluane and Kayuk is not yet definite because the archaeological data is incomplete, but there does seem to be a firm nexus between both Champagne and Nayuk and also between Gladstone and Tuktu.

The next area to be considered is the Kotzebue region of Alaska near Bering Strait. Further research in this region may show that this sequence, with minor differences, is characteristic of the whole Alaskan coastal area from the Naknek River to at least Pt. Barrow (Fig. 81, Area 7). Giddings has established a sequence of ten cultural complexes at Cape Krusenstern, Alaska (Giddings 1961). The sequence is based upon some stratigraphy, at Cape Denbigh and Onion Portage, beach ridge dating and some Carbon 14 dates. Except for the earlier two complexes, the sequence is one of the better established ones in northern North America. It is not surprising that there is little Kotzebue archaeological material which is directly comparable to the southwest Yukon, for it is many miles away and, also, the Kotzebue region has a radically different environment.

The last five phases at Kotzebue, listed from late to early and including Punuk, Birnirk, Ipiutak, Norton, and Choris belong to the Inuk tradition which does not occur in the interior. The four preceding phases listed from late to early are Battle Rock, Old Whaling, Late Denbigh, and Denbigh which belong to the Arctic Small Tool tradition and are usually found in the tundra or Arctic Ocean drainage area. As would be expected, the later manifestations, i. e., Battle Rock and Old Whaling, fit this tradition less well. Except for the use of microblades, polyhedral cores, and a few other general similarities, these complexes bear little resemblance to assemblages in the southwest Yukon. What resemblances exist are usually traits rather than whole complexes, and are of a tenuous nature. For instance, a unique polyhedral core, unlike any found on other beaches, was found on an early beach associated with Denbigh. The core is sufficiently complex and its reinvention seems unlikely. It would appear to be either a trade object or one made locally from concepts derived elsewhere. The core itself is roughly tongue-shaped, with one narrow edge having a fluted surface from the striking platform to the retouched base. The striking platform is at an acute angle to the fluted surface, and previously had been fluted by burin blows and by the removal of

microblades. In Japan this is referred to as the Shirataki technique and in the southwest Yukon it is found only in the Gladstone horizon. Also, a fragment which at least was similar came from the Campus site. As noted, this is roughly of Gladstone times. True tongue-cores were found only on Denbigh beaches on the coast, with the exception of a displaced one from an Eskimo house near the stratified site at Onion Portage on the Kobuk River (Giddings 1952: 71). In the interior there are many such cores in Little Arm and Gladstone remains. Further, a few probable Denbigh-like tools are found in interior sites. One of the burins from the Campus site, of Gladstone times, is definitely a Denbigh type (Irving 1955). It might also be added that the neatly chipped, ripple-flaked side blade at the Tyone site is aberrant for complexes of the Northwest Microblade tradition, but it is typical of the Arctic Small Tool tradition and the later part of the Northwest Microblade tradition overlapped in time.

Apparently, a complex called Palisades II precedes the Cape Krusenstern remains mentioned above (Giddings 1961). The artifacts of this complex were found on the surface, or just under, or in the sod on a hill overlooking the beaches, from whence came the other complexes. Palisades II remains are not stratigraphically related to the other remains. The placement of Palisades II as earlier than the complexes mentioned above, apparently is based on the observation that none of its tool types were found on the beaches, and that its artifacts and flakes "are somewhat encrusted with lime and nearly all show a degree of patina" unlike those on the beaches (Giddings 1961: 159).

Unlike the later horizons, Palisades II, with a much more limited sample of artifacts does show resemblances to complexes of the southwest Yukon, as well as to those of the Brooks Range. Gladstone of the southwest Yukon, Tuktu of the Brooks Range, and Palisades II have in common the following traits Milnesand-like, Lockhart, Besant, Anderson, and Refugio projectile point types, end-of-blade scrapers, triangular flat-topped end scrapers, bifacial choppers, many fragments of ovoid (?) bifaces, burins made on artifacts which are either scrapers or projectile points, Fort Liard flake burins and "true blades in the Old World sense" (Giddings 1961: 159). Further, Palisades II and Gladstone have chi-thos in common, while Palisades and Tuktu both have pebble choppers. The numerous other resemblances between Tuktu and Gladstone have been previously noted. On the basis of the above evidence, there is little doubt that the three are closely connected. Apparently, the one major difference between the three is that Palisades II lacks microblades and polyhedral cores. From my brief examination of Giddings' materials, I believe this so-called difference is more apparent than real. First, four objects from the Palisades site which are as chemically changed as any from the Palisades complex, I believe to be small fragments of microblades, while Giddings on the other hand writes that "microblades in clearly defined form are not present in Palisades II" (1962: 19). Second, one microblade was actually found on the Palisades site. Because it is not patinated, Giddings believes it to be intrusive.

Third, Giddings in his survey found a site (site eight) up the Squirrel River above Kiana summit which had the following types of artifacts which he illustrates (1962):

Palisades notched projectile points	Plate VI, No. 56
An artifact or Fort Liard burin	Plate VI, No. 4
Flat-topped end scrapers	Plate VI, 3-7
Large prismatic blades	Plate VI, 18-23
Side scrapers, a biface chopper, and an end-of-blade scraper	Plate VI, No. 17
Tabular polyhedral core	Plate VI, No. 1
Microblades	Plate VI, No. 8-17

This assemblage I believe to be another Palisades II component. Obviously no definite answer can be given at present as to whether the Palisades II complex does or does not have microblades or polyhedral cores because the Palisades complex is so poorly known. Only future excavations of more components can decide the matter. Regardless of this difference of opinion about the microblades, Palisades II, Gladstone and Tuktu, because of the many other similar traits they share in common, are clearly related.

Giddings also has predicted a Palisades I complex. This is based on thirty-eight flakes, some of them utilized, chopper tools made of beach pebbles, and the fragment of a single-shouldered blade found on the surface of the Palisades site. This resembles no complex we have uncovered in the southwest Yukon. Thus, it is only on the level of the Palisades II complex that there are cultural relationships between the southwest Yukon and the Kotzebue region (Fig. 82).

The final area to be considered is southwest Alaska (Fig. 81, Area 10). From my superficial knowledge of this region it appears to have had an even more complex prehistory than the other areas considered. Apparently, the earliest cultural remains were those found by the University of Wisconsin in 1962, in test excavations on Anangula Island in the Aleutians. Here a few flakes with adhering prepared striking platforms, some unifacial tools, and some possible crude blades were found in the stratum just above glacial deposits and below four volcanic ash layers, each separated by sand. The above stratigraphy suggests great geological antiquity. The general resemblances of some of the flakes to those of British Mountain, and the fact that some of the blades are like those of the Cordilleran Tradition, also suggests antiquity. Such meager clues are reason for guessing that these are the earliest cultural materials so far found in southwest Alaska.

Nearby, on the surface of the sand dunes was found a small polyhedral core, microblades, and a few other tools. Until more investigations have been undertaken it is difficult to tell whether these surface materials are associated with those from the initial tests. It is my opinion they are not associated, but belong to some tradition analogous to the

Arctic Small Tool. Definite Arctic Small Tool tradition remains have been found in the Brooks River Gravel Phase of the Naknek drainage (Cressman and Dumond 1962). These two sets of materials seem to be the earliest so far discovered in southwest Alaska, and on the basis of our limited knowledge they do not appear to be directly related to anything in the southwest Yukon. Future investigations should tell us more about these remains and yield some very significant results.

Following these remains in southwest Alaska are three regional sequences which are even less similar to our Yukon materials. In the Aleutians there seems to be one developmental sequence, and in the Cook Inlet region, de Laguna has delineated a distinctive sequence going from Katchemak Bay I to IV (de Laguna 1934). The remains from the Naknek drainage are different from both of these and appear to be related to the Arctic Small Tool and Inuk materials in the Seward Peninsula and northern coastal Alaska (Cressman and Dumond 1962).

DISCUSSION OF POSTULATED TRADITIONS IN NORTHWEST AMERICA

The British Mountain Tradition

Apparently the earliest tradition which has been found in the north is called British Mountain (MacNeish 1959a). It is at present poorly defined, because as yet no component has been excavated, in a stratigraphic context that either positively shows all the associated artifact types or allows one to estimate its age with any degree of accuracy. Chemical changes in the flint materials at the three Kogruk sites in the Brooks Range (Campbell 1961) as well as changes in the flint of the British Mountain complex along the Firth River are reasons for proposing that these are the earliest remains in these areas. Obsidian rind determinations at a Kogruk site in the Brooks Range, faunal associations, and stratigraphy at the badly frost-heaved part of the Engigstciak site tend to show a similar picture. Perhaps the most important evidence for the early placement of British Mountain are the two British Mountain type flakes found on the clays under the sands at the buffalo pit at Engigstciak on the Firth River.

It was perhaps unfortunate that the artifacts of this tradition were first recognized at the Engigstciak site where they came from thirteen places which were modified by complex soil folding and slipping due to frost. Upon subsequent excavations, analysis, and study of the soil problems, the initial definition of the complex was inevitably altered (MacNeish 1956, Plate I; 1959a, Plate I). Nevertheless, a series of similar distinctive artifacts was found not only at Engigstciak, but at another single occupation along the Firth River, NhVe-2 (MacNeish 1959a), at the Kogruk sites in the Brooks Range (Campbell 1961) and at the Katakturuk River Lookout site (site 7) on the northern slopes of the Brooks Range (Solecki, personal communication). Common to all these components are discoidal cores and flakes struck from these cores, often with the striking platform adhering. These flakes are often worked on one or two edges on the same or opposite surfaces to form scrapers or knives. Others are worked on the narrower end of the flake to form end scrapers, or they may be notched to form spokeshave-like implements, or serrated to form saw-like implements. Also found are blades that may have been struck from discoidal cores and pebble choppers (there is only a very small fragment of one from Kogruk found in 1961). Common to Firth River and Campbell's Kogruk Complex are crude unifacial projectile (?) points, a few crude bifaces, crude end-of-blade scrapers, very large flake knives struck from discoidal cores having retouching along two edges, and discoidal flakes that have all edges retouched except at the adhering striking platform. Scraper-plane-like choppers also occur on the Firth River and at Solecki's site.

The above traits seem to be good British Mountain tradition diagnos-

tics. More neatly made lanceolate or lenticular unifacial points made from flakes struck from discoidal cores, central burins, and crescentic or hooked gravers from flakes from British Mountain, as well as flake gravers and crude-polyhedral-core-like tools from Kogruk might be tentatively included as characteristics of the tradition. In addition it may be noted that Palisades I has pebble choppers and the same type of Levallois-like flakes. Tests from Anangula in the Aleutians yielded remains like those found in the British Mountain tradition, but one must await more diagnostic materials found in better archaeological context before any definite relationship may be shown. In conclusion, there does seem to be a British Mountain tradition because a complex of traits recurs at a number of widely separated components. Thus, no matter how imperfect the archaeological context and evidence for dating the British Mountain tradition, it cannot be wished out of existence.

The Cordilleran Tradition

Components of the Cordilleran tradition are more numerous and many are found in better stratigraphic context. The Kluane complex of the southern Yukon and the Flint Creek complex of the northern Yukon (MacKay, Mathews, and MacNeish 1960: 36) both were found in strata under later remains. To the south, components from Fraser Canyon, British Columbia (Borden 1960), Five Mile Rapids in Washington (Daugherty 1956), and the Dalles in Oregon (Cressman 1960) are the lowest cultural remains in deep stratified sites. A possible component from Ramparts Rapids, Alaska, also was found in a deeply buried stratum, indicating considerable antiquity (Rainey 1939).

A number of new radiocarbon age determinations from the more southerly components allow one to estimate more accurately the time period of this tradition. Some of these are 6200 B.C. ± 300 (S-47), 7050 B.C. ± 150 (S-113) for the Fraser remains, 6750 B.C. ± 400 (C-827) for Lind Coulee in Washington, and 7835 B.C. ± 200 (Y-340) for Five Mile Rapids in Oregon. From these estimates and assuming that our northern sites are older, I will guess that the Cordilleran tradition lasted from roughly 12,000 B.C. to 6,000 B.C.

In spite of the fact that many of the components of the Cordilleran tradition were found in good stratigraphic situations, only the southern ones have produced large samples of artifacts. In the north, the tradition is not well defined at present although there are plans for future excavations in a number of the northern components. The Kluane complex of the southwest Yukon has very few artifacts in good stratigraphic position and the recording of the few artifacts from the Klondike site from near Fort Liard is not complete. In the Brooks Range the Kayuk site is mixed with a later component, while Irving's sites from Noutak are from the surface. Only about 100 artifacts from the Firth River Components were located in good archaeological context.

In all components, there were Lerma-like points with or without diamond cross-sections, and prismatic and truncated blades struck from large conical polyhedral cores. Collateral flaking on points that are diamond-shaped in cross-section, split pebble choppers, Fort Liard flake burins, end-of-blade scrapers, teardrop-shaped biface, snub-nosed end scrapers, and points with burin blows on them also are present in all northern components but Kluane. Scraper planes were found at Flint Creek and Kluane, while needles and Flint Creek multi-burins were uncovered at Flint Creek and Kayuk, while scale scrapers and gravers came from Flint Creek and Klondike. Most of the above traits are in one or more of the components to the south. The previously mentioned sixteen traits are herein considered characteristic of the Cordilleran tradition. Other traits which appear only at a single component in the north but are found farther south, such as notched side scrapers or spokeshave-like tools, antler leisters, pebble choppers, sinew stones, pebble pendants, and fish gorges, may also become traits when more research is undertaken. The fact that many of the components are situated along animal crossings or at good fishing spots on streams or rivers in the mountains may be an additional trait.

The Northern Plano Tradition

The Northern Plano Tradition, formerly called Yuma (MacNeish 1959) is well represented in complexes from four areas: the Champagne complex from the southwest Yukon, Nayuk from the Brooks Range, and the Great Bear River and the Artillery Lake complexes from the eastern part of the Northwest Territories. These have in common Agate Basin-like (or Keewatin) and Pelly points, burins made on artifacts or flakes, Fort Liard burins, crude blades and end-of-blade scrapers, ovoid bifaces, flake end scrapers, collateral and ripple flaking, and some variety of snub-nosed end scraper. The Sandy Lake complex from the Simpson-Liard area, with a much smaller sample of tools, is hesitantly assigned to this tradition. While it has many of the traits listed above it does lack flake end scrapers and Fort Liard burins. It might be added that the Agate Basin site in Wyoming has most of these tool types listed above but also has gravers and split pebble choppers. The latter two traits also appear in Champagne so it is possible that these are also characteristic of the tradition.

The Northwest Microblade Tradition

In the southwest Yukon the Northwest Microblade Tradition is defined by the sequence Little Arm to Gladstone to Taye Lake. The chronological position of the phases is based upon stratigraphy, and there are numerous artifacts from a large number of components representing each phase.

A number of distinctive types run through this entire sequence. These are: chi-thos, net sinkers, end-of-blade scrapers, keeled and flat-topped end scrapers, Milnesand-like and Agate Basin-like projectile points, split pebble and bifacial choppers, tongue-shaped and conical polyhedral cores, blades, and microblades. The latter are often retouched to form rounded ends or to form points or they are laterally worked or notched. There also is a large proportion of big bifacial knives and unifacial side scrapers. Some traits, often less well represented, belonging in one or two of these phases, may also be considered Northwest Microblade diagnostics, such as: Fort Liard flake burins and burins made on a blade or microblade, artifact burins, tabular cores, saws, neatly chipped plano-convex end scrapers, unifacial drills, beaver tooth gouges, and a series of large notched and stemmed projectile points. A subsistence pattern seemingly based on lake fishing and forest animal hunting and trapping also is characteristic of this tradition.

Many of the other sites in the north are more hesitatingly assigned to this tradition because they do not have all the diagnostic traits. In part this may be due to the fact that their samples of artifacts are at present more limited. Included in this group are Pointed Mountain, Campus, Fisherman's Lake, N. T. Docks, Lockhart River, Tuktu, Tyone, and Palisades, which all have in common chi-thos, end-of-blade scrapers, snub-nosed end scrapers, large notched points, blades, bifacial knives, and bifacial choppers. The Tuktu chi-tho is rather doubtful and bifacial choppers are not found at Tyone. All the above traits are basic to the Northwest Microblade Tradition. All but Palisades have microblades, and all but Fisherman's Lake and Tyone have Fort Liard burins. Most of the other traits listed for this tradition occur less frequently and spasmodically across the north but all appear in significant numbers only in Pointed Mountain, Campus, and Tuktu assemblages.

The Arctic Small Tool Tradition

The Arctic Small Tool Traditionis not found in the southwest Yukon. It is defined here mainly because it is often confused with the Northwest Microblade Tradition. It is now known from a large number of components not only in the tundra area of the Northwest but also in the eastern Arctic. Many hundreds of artifacts have now been excavated from these components, and Irving, in an attempt to define the tradition better, is now analyzing them. I shall list some of what I consider to be the diagnostics. These are small haftable burins, often multispalled with one or both surfaces retouched, burin spall tools, small, neatly chipped bifacial but sometimes unifacial crescentic side blades, the use of the ripple or collateral flaking technique, small, narrow, conical antler flaking tools, small, delicately flaked end blades that may be lenticular, lanceolate, incipient stemmed or triangular in outline, and rarely side-notched, cuboid, but sometimes conical and tongue-shaped polyhedral cores with

the resultant microblades and blades usually unretouched, and small flat-topped end scrapers. Also present, but of less diagnostic value, may be chipped adze, female toggle-headed harpoon, net sinker, oval shallow stone lamp, and bow and arrows often having antler foreshafts with slots for end blades, or side blades, and these may also be found on the mainshaft. Others may be ovoid semi-subterranean houses with specialized central fireplaces, antler fish gorges, antler hammers, sinew stones, and perhaps stone drill bits. In the west, during the later part of the tradition, pottery with impressed surfaces, antler mattocks, antler needles, and bifacial knives may also be traits to include. The basic economy of this tradition is based upon caribou hunting, supplemented by sea hunting. I also feel sure that as more sites having preserved antler, ivory, bone, and wood are found this list will be greatly augmented.

The North Pacific Tradition

There are two later traditions which seem unrelated to the southwest Yukon. They are out of the area of the present study area so I shall simply list the diagnostic traits which have been determined by others. The first of these is the North Pacific Tradition, including the sequence from Kachemak Bay (I to IV) which was established by de Laguna (de Laguna 1934). Traits that run through her sequence and which appear to be diagnostic of the tradition are boulder chip tools, use of pumice, notched and grooved stones or pebbles, stones with holes in them, the bow drill, splitting and planing adzes, adze socket heads or hafts, oval stone lamps which are often specialized, semicircular stone lamps, small chipped lanceolate and lenticular end blades, ground slate end blades with or without barbs or stems, ground slate men's knives, ground slate notched or unnotched ulus, bone drill bits, female toggle harpoons without inset slots, slender barbed points, smooth-edged saws, barbed fish spear side prongs, barbed barbs for fish spears, composite fish hooks, tubular needle cases, bone wedges, scapula scrapers, labrets, stone carvings, ice picks, burials in coffins, mummification, specialized semi-subterranean plank (?) houses and a maritime economy, perhaps including seacraft.

The Inuk Tradition

The other tradition of similar kind is one I have called Inuk. Various Eskimologists have defined it in part. Following Mathiassen to some extent (Mathiassen 1927), the characteristics of the Inuk Tradition are female toggle-headed harpoons of a variety of types often having side blades and specialized spurs, harpoon end blades of ground slate or chipped chert, often triangular, men's slate or chipped side blades, specialized needle cases, ground slate ulus of a number of types, chipped

contracting-stem end blades, stone or pottery lamps, crude pottery in the west, semi-subterranean specialized houses with specialized entranceways and back beds, barbed antler or bone arrow foreshafts, sled equipment, kayak equipment, sinew back bows, bow drills with stone drill bits, polished or chipped adzes, bone or antler mattocks, labrets, combs, ice creepers and snow goggles, extended burials with grave goods, snow shovels and many other items. Other traits not listed by Mathiassen are snub-nosed end scrapers, bows and arrows, antler adze sockets, leisters, salmon spears, and net sinkers.

Excavations in the Aleutians reveal the probability that another Eskimoid tradition exists in that area. Unfortunately, reports on the recent investigations are not available so, as yet, this tradition cannot be defined.

The Denetasiro Tradition

Roughly contemporaneous with the two or three coastal traditions described above is another in the interior of the northwest which I have named Denetasiro. It includes the material culture of many of the Athabascans. It is originally based upon our materials from the Bennett Lake Phase in the southwest Yukon, which are very limited in number and type. Worse still are the comparative materials from surrounding regions. Needless to say, our definition is therefore most tentative. Prairie and Stott points, small thumbnail and large flat-topped end scrapers, chithos and net sinkers are found at Bennett Lake, Dixthada and Spence River. Stott points are also found at both Fort McPherson and Whitefish Lake. Triangular antler arrows, long bone fleshers, bone beamers, unilateral multibarbed antler or bone arrows, antler leisters, ovoid bifaces, and beaver tooth gouges are found at Fort McPherson, Dixthada, and Bennett Lake and in a collection in the Yellowknife Museum that might have come from a Whitefish Lake component. There are a number of other similarities between Bennett Lake and Dixthada that also may be diagnostic of the complex. These include fish hooks, fish gorges, adzes which are often three-quarter grooved, bone tubes, Catan points, leg bone awls or skewers, needles, and abrading stones. These tentatively are the Denetasiro Tradition traits. Much more research in this horizon is very necessary. It should be done by someone with a good deal of patience, for the Athabascan seem always to have been poverty-stricken. Athabascan sites are not very productive and many must be investigated in order to discover all characteristic traits.

Summary and Interpretation

In the previous pages, I have compared the Yukon phases and complexes with those from surrounding areas, and I have attempted to describe these relationships utilizing the concept of tradition. The earliest

tradition we can discern has been found only in the Brooks Range and in the northern Yukon and is called British Mountain. Following this in time is the Cordilleran tradition which is found in the Simpson-Liard region, central Alaska, and southwest Yukon as well as in southern British Columbia, Washington, Idaho, and Oregon. Based on radiocarbon dates from the more southerly regions, it is estimated that the tradition existed from between 12,000 and 6,000 B.C. It was followed by the Northern Plano tradition in many regions except in British Columbia and western Alaska. Early dates from the Great Plains to the south indicate it may have moved northward and possibly existed from 7,000 to 3,000 B.C. The Northwest Microblade Tradition follows Plano in time in the Yukon, but in the east it is partly contemporaneous with it. Geological considerations in the Yukon, as well as a few Carbon 14 dates, allow one to estimate that it existed from roughly 5500 B.C. to perhaps A.D. 300. An Arctic Coastal Tradition called Arctic Small Tool Tradition overlaps the later stages of the Northwest Microblade Tradition. Radiocarbon dates indicate that it may have existed from about 4000 B.C. to 1000 B.C. (Rainey and Ralph 1959). Radiocarbon determinations are also the basis for estimating that the North Pacific Tradition existed from at least 1500 B.C. to A.D. 1000, and that Inuk existed from a maximum date of 1500 B.C. to A.D. 1900 in the coastal areas (Rainey and Ralph 1959), and the Aleutian Tradition is dated from 2000 B.C. to A.D. 1800 (Laughlin and Reeder 1962). The Denetasiro tradition has been estimated as having existed in the northwest interior from 300 A.D. at the earliest to A.D. 1,900. The estimate is based upon geological considerations. These hypothetical reconstructions of the sequence of culture and tradition in the north are my estimates in 1962. I am sure the picture will change as more data becomes available.

SPECULATIONS CONCERNING THE PEOPLING OF THE NEW WORLD

In considering the problem of the peopling of the New World one must embark on a comparison of traits from the northern cultural complexes and/or traditions of the New World with those from nearby eastern Asia. There are many serious limitations to making such comparisons, but to attempt to do so is certainly worthwhile. It is useful to assess every possible clue which throws light on how man entered the New World, and to examine concrete evidence concerning the long held hypothesis that the American Indian is derived from Asia. Both approaches provide, of course, crucial data contributing to the solution of the problem at hand.

Some of the obstacles involved in making these comparisons must be mentioned for they determine the methods I shall use. First of all, there is the question of the quality of the basic data available in the areas near Bering Strait. As I have stressed so often, our Northwest New World sequential data is limited and all conclusions are tentative, but in a comparable area in northeast Asia the situation is far worse. There are almost no long well-documented sequences and little, if any, stratigraphy. In fact, in Asia, well-defined sequences exist only as far east as the Lake Baikal area, or in Japan. These regions are considerably more remote from Bering Strait than any we have mentioned in the previous pages on New World comparisons. Therefore, what has been said about the inadequate information we have on dating sequences in the New World is even more true of eastern Asia.

Another limiting factor concerning the eastern Asiatic archaeological date is that it is difficult to obtain and to understand. Many excavations and sites have not been fully reported, and even those that are fully reported have been naturally enough published in Russian or Japanese. Further, comparisons even when using the fullest reports available are dependent upon illustrations in these reports, not on actual artifacts. I had arranged, actually, to see the Siberian artifacts but, unfortunately, was prevented from accepting the Russian invitation by the Canadian governmental department of Northern Affairs and National Resources. Finally, synthesis of materials in eastern Asia is rarely attempted by those working in those areas, so one is forced into the nearly untenable position of making such syntheses for them.

In my attempts to make comparisons with eastern Asia, I shall consider basically only five areas: The Trans-Baikal, Japan, Middle Lena, the lower Lena-Kolyma area, and the Chukchee Peninsula, and I shall only allude to the upper Amur-Mongolia area and to the Northeast Pacific coast of Asia. This plan, to some extent, follows the culture areas of Northeast Asia determined by Chard (Chard 1960). In considering these areas I shall mention only schematically their cultural sequences, and even these I shall describe very superficially. However, I will emphasize specific tool types which are similar to those in Northwest North America.

Finally, I shall summarize these data by plotting where certain of the sequential traits of the Northwest American tradition appear in the Asiatic sequences or periods. I make these myopic comparisons because I am interested only in seeing those Asiatic contributions which relate to the formation of our limited Northwest America traditions.

The sequence from the Trans-Baikal is our best for eastern Asia, thanks to the work of Petri, Auerbach, Sosnovskii, Gromov, Debetz, Okladnikov, and others. My brief summary of it is for the most part taken from translations of Okladnikov. The earliest remains in this area are supposedly from early Late Pleistocene times (Okladnikov 1961), and were uncovered at Mal'ta-Buret and the Irkutsk Military Hospital sites. I shall refer to these remains as the Mal'ta-Buret complex. This cultural complex may be characterized as having some chipped tools similar to southeast Asia, a whole series of unifacial tools made from flakes struck from discoidal (Mousterian-like?) cores, as well as some upper Paleolithic tools such as blade-like flakes, scrapers, and burins (Okladnikov 1959). There follows a list of specific traits which are found in the Mal'ta-Buret complex and in the British Mountain tradition (Table 9).

Lenticular and lanceolate unifacial points made on flakes from discoidal cores	Bonch-Osmolovsky and Gromov 1936, Plate 17, Nos. 1 and 3; MacNeish 1959, Plate I, Nos. 1 and 3.
Pebble choppers	Okladnikov 1959, Plate IV; MacNeish 1959, Plate I, No. 15.
Discoidal cores	Bonch-Osmolovsky and Gromov 1936, Plate 17, No. 17; MacNeish 1959.
Notched scrapers or saws on flakes from discoidal cores	Bonch-Osmolovsky and Gromov 1936, Plate 17, No. 18; MacNeish 1959, Plate I, No. 7.
End scrapers on flakes from discoidal cores	Bonch-Osmolovsky and Gromov, 1936, Plate 17, No. 12; MacNeish 1959, Plate I, Nos. 9 and 10.
Central burins on prepared flakes	Bonch-Osmolovsky and Gromov 1936, Plate 17, No. 9; MacNeish 1959, Plate I, No. 6.
Prepared flake knives or side scrapers	Bonch-Osmolovsky and Gromov, 1936, Plate 17, Nos. 4 and 15; MacNeish 1959, Plate I, Nos. 11 to 14.

Prepared flake hook gravers	Bonch-Osmolovsky and Gromov, 1936, Plate 17, No. 7; MacNeish 1959.
Blade-like flakes	Bonch-Osmolovsky and Gromov, 1936, Plate 17, Nos. 16 and 18; Campbell 1960.
End-of-blade scrapers	Bonch-Osmolovsky and Gromov, 1936, Plate 17, No. 12; MacNeish 1959, Plate I, No. 7.

It must be remembered that these similarities by no means exhaust the varieties of types in either of the two complexes. It also must be noted that the gravers, scraper-planes, pebble pendants, and bone needles of Mal'ta-Buret (Bonch-Osmolovsky and Gromov 1936, Plate 17) are found in the Flint Creek complex in the Yukon (MacNeish 1959, Plate II).

Following Mal'ta-Buret in what Okladnikov considers to be middle Late Pleistocene times or late Late Pleistocene times, are a number of components from Afontova Gora III, Ust-Kiakhta, Locality 4 and a site near Sannyi Mountains (Okladnikov 1961). This complex I shall call Afontova Gora. Many of the Mousterian-like flake tools continue, as well as the pebble tools, but during this stage there are many more true burins on blades, blades, end-of-blade scrapers, conical nuclei and bifacial lenticular points. In Northwest America these latter four traits appear in the Cordilleran tradition which also is the second complex in time in the area.

The Verkholenskaya Gora complex appears in latest Pleistocene or just post-Pleistocene times. It is represented by many components in the Trans-Baikal area such as at Oshurkovo, upper levels in the Sannyi Mountains, Ulan-Bator, and other sites. Bifacial knives and lenticular bifacial points are present, blades and microblades struck from tongue-shaped or conical polyhedral cores, end-of-blade scrapers, snub-nosed plano-convex end scrapers, large side scrapers and choppers, retouched blades in various forms and bilateral multi-barbed antler points (Field and Prostov 1937), are New World traits which appear in this complex. Many of them occur in the Cordilleran and Plano complexes, but the microblades, tongue-shaped cores, and bilateral antler points do not occur until the time of the Northwest Microblade Tradition.

The next stage, in early recent times, is called Khin'skaya and is not as well defined as some of the earlier cultural complexes. Core and blade tools dominate this horizon though long bone points, lamellar burins, and leaf-shaped points are found. The pointed microblades (Okladnikov 1950, Plate 16, Nos. 5 and 10), the round end microblades (Okladnikov 1950, Plate 17, lower left), the notched microblades (Okladnikov 1950, Plate 17, lower right), the burins made on microblades (Okladnikov 1950, Plate 17, lower right center), beaver tooth gouges (Okladnikov 1950,

Plate 15), and unifacial drill-like tools, have specific resemblances to Little Arm, Gladstone and Pointed Mountain of the Northwest Microblade Tradition. Let me hasten to add that there are a large quantity of artifact types in the latter that are not in Khin'skaya.

Apparently developing from Khin'skaya is the much better defined culture called Isakovo, dated between 3000 and 4000 B.C. (Okladnikov 1950). This complex is represented by ceramics, often net impressed (Okladnikov 1950, Plate 19-22), chipped end blades, arrow points (?) (Okladnikov 1950, Plate 29), ground stone adzes, ground stone effigies (Okladnikov 1950, Plate 26), microblade and bifacially chipped side blades, and a host of other traits. A number of Isakovo tool types occur in the New World. Microblades struck from cuboid cores, small bifacial triangular and incipient stemmed end blades, and chipped adzes are typical Arctic Small Tool traits. Asymmetrical, tanged, bifacial arrow points are found in Little Arm of the Northwest Microblade tradition, while rectangular side blades (Okladnikov 1950, Plate 31) and antler mattocks (Okladnikov 1950, Plate 28), occur in New Mountain of the Arctic Small Tool Tradition. Some of the Isakovo ceramic traits, such as granular tempered, conical vessel forms, and complete perforation of rims as a decorative technique also exist in the Firth River Complex, a late poorly defined aspect of the Arctic Small Tool Tradition. Tubular needle cases also occurred in Isakovo (Tolstoy 1958, Table 3). The only early examples of these in Alaska are in Kachemak Bay I (de Laguna 1934).

The Serovo period from 2500 to 3000 B.C. is the cultural climax of the Neolithic in the Trans-Baikal area (Okladnikov 1950). Not only are sites larger and richer but there are many new types of pottery, more kinds of bilateral fish spears, polyhedral burins, new kinds of polished stone tools, and new types of burials. The bifacial side blade types continue as do many end blades, and, as well, pointed antler flakers and cylindrical antler flakers. These are all Arctic Small Tool Tradition traits. Notched pebble net sinkers are similar to those in the Northwest Microblade Tradition. Ripple flaking and Agate Basin-like points of the Plano complex are also found as well as male harpoon and compound fish hook shanks similar to those in the North Pacific Tradition. The Isakovo pottery is only similar to New World pottery in a general way, but Serovo pottery has more specific resemblance to the ill-defined Firth River, Buckland Hills, and Joe Creek complexes of the Yukon, and perhaps Battle Rock and Choris of Alaska. Some of these resemblances include fiber tempering and the making of pots by the coil method. Fabric impressions and cord marking are similar to Firth River and Battle Rock. Dentate stamping is similar to Buckland Hills, and linear stamping corresponds to both these and Joe Creek and Choris. Although there are many significant resemblances between Arctic Small Tool Tradition and Serovo, they are outweighed by the many differences.

Kitoi stage, 2500 to 1500 B.C., is less well represented than the previous horizon. Many of the bifacial chipped stone arrow points and side blade types continue, but microblades and burins are on the wane.

The pottery has more ornate dentate stamping. Polished nephrite artifacts are common and different ornaments appear. New American traits are small, fine, half-moon side blades like those similar to the Arctic Small Tool Tradition, chi-thos and beaver tooth gouges similar to the Northwest Microblade Tradition, and chipped ulus, smooth edged saw, ground slate men's knives and bone whistles similar to the North Pacific Tradition (Tolstoy 1958a).

The Kitoi develops into Glazkovo (Okladnikov 1955a). Glazkovo marks the introduction of the Bronze Age. In addition to the use of bronze, new pottery types, nephrite rings, new types of adzes, different bone tools, and an economy based upon fishing are distinctive characteristics. Among the traits which have American affinities are the small lenticular endblades like those in the Arctic Small Tool Tradition. Check-stamp pottery is also characteristic and as well there are large asymmetrical side blade knives, combs, antler adze sockets, bone or antler spoons, bone eye sockets for burials, and split bone arrows, all of which appear early in the Inuk Tradition although the last four also appear in the North Pacific Tradition. Some of the small side notched arrows in Glazkovo also look like later Denetasiro types and so do the small thumbnail end scrapers.

At about the time of Christ, the Iron Age accompanied by a great dependence on reindeer, began. In this final period there are few artifacts which are directly comparable to those in the New World.

In our limited comparisons between the Trans-Baikal sequence and the traditions of Northwest America a few similarities have been described. We have noted that there are many similarities at early levels such as between the British Mountain and the Trans-Baikal Paleolithic; that ties are less, comparatively speaking, with Cordilleran, Plano, and Northwest Microblade; that during the Neolithic of Lake Baikal there are more similarities to Arctic Small Tool Tradition, but these likenesses diminish as the Bronze Age unfolds and then appear to die out by the time of Christ (see Tables 9, 10, 11).

Comparisons between the Northwest and the Middle Lena sequence reveal a somewhat similar picture. Unfortunately, the Middle Lena sequence is far less complete, which may be the reason why the similarities are less numerous (Okladnikov 1955). Remains as early as Mal'ta-Buret have not yet been found in the Middle Lena. The nearest similarities are a few flakes, either tools or scrapers, struck from prepared discoidal cores, from Chastino (Okladnikov 1953). However, these seem to be in the same time period as Afontova Gora III of the Trans-Baikal. Small sites of very late Paleolithic, like Verkholenskaya Gora, were found at Shishkino, Markhachan, Hamra, and elsewhere. Shishkino has the largest inventory of tools, all of which are found in the New World. We list these below.

Tongue cores	Okladnikov 1953, Plate 8, No. 6
Snub-nosed end scrapers	Okladnikov 1953, Plate 11, No. 3
End-of-blade scrapers	Okladnikov 1953, Plate 10, No. 3
Blades	Okladnikov 1953, Plate 11, Nos. 4 and 7
Conical polyhedral cores	Okladnikov 1953, Plate 9, Nos. 1-3
Scraper planes	Okladnikov 1953, Plate 11, No. 1
Ovoid bifaces	Okladnikov 1953, Plate 10, No. 5
Pebble choppers	Okladnikov 1953, Plate 10, No. 6

The first of these are present with the Northwest Microblade Tradition. All the others appear earlier in the Cordilleran Tradition. Also, I am informed by H. M. Wormington that fragments of Cordilleran Lerma-like points and flake burins are found in the Middle Lena region. I have not been able to find any report of pre-ceramic remains like Khin'skaya of the Trans-Baikal for the Middle Lena region with the possible exception of Kullaty IV. This lowest level of the Kullaty site had only a few lamellar flakes or blades and microblades, so it is difficult to classify.

Neolithic remains in the Middle Lena are very numerous. According to Tolstoy's analysis (Tolstoy 1958) there are four general periods. The type site of the earliest period is Bestyakh (Okladnikov 1950: 20-21). This period is characterized by net impressed sherds similar to Isakovo and Serovo, cuboid polyhedral cores, blades and microblades, end scrapers and small bifacial triangular points (Tolstoy 1958: 404). The Turukta group follows this first period. Its pottery is often linear stamped and has incising or dentate stamp decoration near the rim. The stone artifacts are not very different from the previous horizon though a rectangular side blade did appear. The third group is called Kullaty-Munku and appears to be roughly contemporaneous with Serovo and Kitoi in the Trans-Baikal. The rich stratified deposits from Kullaty II and III give us a fuller picture of this complex in which there are many New World similarities. Its end-of-blade scrapers (Okladnikov 1955, Plate 21, No. 11), needles (Tolstoy 1958a), flake burins (Tolstoy 1958a), and blades (Tolstoy 1958a), first appear in the New World in Cordilleran. Its pebble net sinkers (Tolstoy 1958a), burins on microblades (Okladnikov 1955, Plate 21, Nos. 12 and 13), round end microblades (Okladnikov 1955, Plate 20, No. 5), asymmetrical triangular point and tongue cores (Tolstoy 1958a) correspond to those of the Northwest Microblade tradition. Its Yuma or ripple flaking is similar to the Northern Plano tradition and others in the New World. Its half-moon, small, bifacial side blades (Okladnikov 1955, Plate 21, No. 3), the small bifacial rectangular side blade (Okladnikov 1955, Plate 21, Nos. 7 to 10), cuboid polyhedral cores (Tolstoy 1958a), small, lenticular, bifacial end blades (Okladnikov 1955, Plate 17, Nos. 24 to 35), small, bifacial, lanceolate and triangular end blades (Okladnikov 1955, Plate 17) and small, incipient stem points (Okladnikov 1955, Plate 17, No. 23) are similar to those first appearing in the Arctic Small Tool Tradition. Ceramic traits such as crack lacing

(Tolstoy 1958a), decorations of circular perforations, cord marking, linear stamping, and fabric impressing (Okladnikov 1955, Plate 16) are present in the Firth River and its dentate stamping first appears in Buckland Hills -- both of which seem to be late descendants of the Arctic Small Tool Tradition. Polished adzes (Okladnikov 1955: 81), bone whistles and tubular needle cases appear earliest in America's Northwest in the North Pacific Tradition.

The next period is characterized by Kullaty I and Ymyiakhtakh (Tolstoy 1958). This period is latest Neolithic and earliest Bronze Age and though it has many new traits it has fewer new New World traits. Fiber tempering, small check stamping, bows, drill bits, and split base arrow points occur (Tolstoy 1958a) and are similar to those in early Inuk. Surprisingly enough one burin from Ymyiakhtakh (Okladnikov 1955, Plate 27, No. 7) is very much like those of the Arctic Small Tool Tradition.

The final three periods of the middle Lena belong in the late Bronze and Iron Ages. They display no new similarities to types in the New World that were not there already.

The final area in the Arctic drainage of northeast Asia which I shall discuss is that in the Lower Lena and Kolyma River Valleys. In contradistinction to both Chard and Tolstoy, I exclude the Chukchi Peninsula from this area because I consider that the investigation by Dikov and Okladnikov indicate that the two regions have rather different sequences of culture. Far less work has been done in the Lower Lena and Kolyma River Valleys than those previously discussed and there are few complete reports on what little has been done. Similarities to the New World are not numerous and the periods poorly defined.

Few pre-ceramic sites have been reported and those that have been found contained few artifacts. None of them could be considered Paleolithic. Included in the earliest Uolba burials were four long stemmed unifacial points unlike any New World artifacts. There was also an end-of-blade scraper corresponding to New World types (Chard 1956, Fig. 133, Nos. 1 to 5). A microblade, cuboid core, and Serovo-like bifacial knife were found at Kestriryungka but these only have vague New World affiliations (Okladnikov 1946: 135, site 88). Other sites have even less materials.

The periods with ceramic remains are also difficult to discern. According to Tolstoy (Tolstoy 1958), materials from Chokurovka and Syalakh (site 48) appear to be the earliest, about of Serovo times. Both of these have crude grit-tempered and conoidal-formed pottery, dentate stamp and rim perforation decoration on the pottery like the early pottery in northwest America. The microblades, burins on blades, and most of the blades from Syalakh (Chard 1956) correspond to those in the Northwest Microblade Tradition, and a half-moon side blade is similar to those of the Arctic Small Tool Tradition. There is a piece of a ground slate man's knife, possibly resembling the type characteristic of the North Pacific Tradition.

Later Neolithic remains appeared in the lower and upper levels of

the Uolba site (Chard 1958). Uolba I coiled pottery with fiber temper, crack-lacing, linear stamping, and cord marking is similar to Firth River pottery. Microblades and polyhedral cores, burins on blades, small bifacial incipient stemmed points, triangular points, snub-nosed end scrapers, and half-moon side blades (Tolstoy 1958: 410) are Arctic Small Tool Tradition traits. A chi-tho of Uolba I times (Tolstoy 1958a: 65) is a Northwest Microblade Tradition trait. Uolba II is characterized by fine and large check stamp pottery. Other New World traits of this time period are microblades, rectangular and half-moon side blades, polished adze, grooved adzes, end-of-blade scrapers, abrading stones, contracting stem points, chi-tho, chipped ulus, burins on blades, and Denbigh-like burins (Tolstoy 1958 and 1958a). Information from later sites and cultures of the Bronze and Iron ages from this area are rare and not available to me.

In contrast to these sequences in the Arctic Drainage of northeast Asia is the material from the Pacific Drainage. As Chard has pointed out, this is a key area for the derivation of traits in the New World and is archaeologically almost unknown except for the Japanese area. A little work has been done in the Amur Valley but the sequence is not well determined. I will discuss the Japanese sequence and only mention the Amur materials when they seem pertinent.

Pre-ceramic remains in Japan were not seriously considered until 1949, but since that date a great number of sites have been excavated and reported. So far a number of syntheses have been attempted (Kidder 1962) but none of them are very satisfactory. In this article I shall follow the five-period sequence proposed by Serizawa and Ikawa (1960: 30-35). The largest assemblage of the earliest remains has been found in the Iwajuku I and Gongenyama components. This period which has been called the Hand Axe period and which I shall call the Iwajuku period is characterized by hand axes or large bifaces, and large prismatic flakes. It bears little resemblances to anything in northeastern Siberia or northwest America though a few of the flakes illustrated look as though they may have come from some variety of discoidal pebble chopper, or Levallois-like core. It has been suggested that these materials date from the beginning of the Fourth glaciation. The next period, supposedly as old as the first interstadial of the Fourth glaciation, is characterized by the introduction of the blade technique. The Kamiyama site is representative of this period in Southern Japan and bears little resemblance to other North Asiatic or New World assemblages. In Hokkaido, Locus 13 and 38 of the Shirataki site seem to be of this period.

The next period is characterized by a variety of points, often lenticular, boat-shaped cores and blades with steeply retouched edges. This Sakkotsu period seems to be of latest Pleistocene times. The Sugikubo and Sakkotsu sites are fairly typical of this period and bear a general resemblance to Verkholenskaya Gora, and Shishkino in Siberia, and the Cordilleran of the New World. They have flake burins, lenticular points and blades struck from polyhedral cores. Perhaps its most important

resemblances are to the Osipouka and Ocuhubka sites near the mouth of the Amur in the U. S. S. R. These sites are worthy of further note for they have many resemblances to Cordilleran in the New World. Common to both are large blades and crude polyhedral cores, Lerma and Lerma-like points (Okladnikov 1959, Plate 27), scale scrapers, scraper planes or uniface choppers (Okladnikov 1959, Plate 5), bifaces, slab choppers, end-of-blade scrapers, snub-nosed end scrapers, and flake burins (personal communication, H. M. Wormington). This is a very specific link between the late Paleolithic of Siberia, Japan, and the New World.

The next horizon is here called Tachikawa and is represented by Locus 30 at the Shirataki site and Tachikawa in Hokkaido, as well as many more southern Japanese sites. It is a complex characterized by microblades struck from specialized tongue-shaped cores, and ties very closely to the microblade cultures from Mongolia reported by Nelson and Maringer, as well as to the Tegrovaia site reported by Okladnikov (1959) from north of Vladivostok. While it is only superficially like the Khin'-skaya materials from northeast Siberia, it does have a truly remarkable resemblance to the Northwest Microblade Tradition assemblages in America. The artifacts common to both are listed below. The first nine are very significant and ten to seventeen are almost as important. There are, of course, many differences between the Japanese materials and those from the Northwest Microblade Tradition but they do not outweigh the similarities.

1. Truncated blades and microblades	Yoshizaki 1959, Plate 6.
2. Blades retouched to form rounded ends	Yoshizaki 1959, Fig. 6, No. 1.
3. Notched microblades	Yoshizaki 1959, Fig. 14, No. 3.
4. Microblades retouched laterally	Yoshizaki 1959, Fig. 6, No. 3.
5. End burins on microblades	Yoshizaki 1959, Fig. 16.
6. Tongue-shaped cores with retouched tips and fluting on one lateral side with striking platforms at right angles to the fluting	Yoshi zaki 1959, Nos. 6, 8, 9.
7. Tongue-shaped cores with retouched tips and fluting on both lateral sides with striking platforms at right angles to the fluting	Serizawa and Ikawa 1960, Fig. 4, A4.

Table 8

Tentative Correlations of Cultures in Eastern Asia with Those in Northwest America

Age in Hundreds of Years	North China Mongolia	Japan and Mouth of Amur River	Trans Baikal	Middle Lena	Lower Lena-Kolyma	Chuckchee Peninsula
10						Punuk
0		Iron Age	Iron Age			Birnirk Uelen Okuik
1		Yayoi		Kullaty I	Siktyakh	
2			Glazkovo		Uolba II	Vakernaia
3		Jomon	Kitoi Serovo	Kullaty II Kullaty III	Uolba I	Ust-Belaia
4		Proto-Jomon	Isakovo	Turukta Bestyakh	Sylakh	Lake El'gytkhyn
5	Dali Nor					Anguyema
6		Takei	Khin'skaya	Kullaty IV	Uolba Burial	
7	Dune Dwellers	Tachikawa	Upper Oshurkovo		?	?
8			Verkholenskaya Gora			
9 10	?					Lake El'gytkhyn cache
11		(Osipovka)		Shishkino		
12 13		Sugikubo				
14 15 16			Afontova Gora III			
17	Ulinkhe River	?		Chastino		
18 19 20 21 22 23 24						
25 26			Mal'ta-Buret			
27 28 29 30			Irkutsk Military Hospital			
31		Kamiyama				
32 33 34 35	Sjara-osso-gol					
36 37 38		Iwajuku				
39 40						

Southwestern Alaska	Seward Peninsula	Brooks Range	Northern Yukon Territory	Southwest Yukon Territory	Northwest Territories	Age in Hundreds of Years
Katchemak Bay IV	Punuk		Whitefish Station	Bennett	Spence River	10
Katchemak Bay III Katchemak Bay IIIa	Birnirk Ipiutak	Ipiutak	Cliff	Aishihik		0
Katchemak Bay II	Norton Choris		Joe Creek		Fisherman's Lake	1
Katchemak Bay I	Battle Rock Old Whaling		Buckland Firth River	Taye Lake	N.T. Docks	2
Brooks River Gravel		Natuakruak	New Mountain		Pointed Mountain	3
	Denbigh Palisades II	Tuktu		Gladstone	Bear River	4
				Little Arm		5
		Naiyuk		Champagne	Sandy Lake	6
					Franklin Tanks	7
		Kayuk		Kluane	Klondike	8
			Flint Creek			9 10
						11
						12 13
						14 15 16
						17
			British Mountain			18 19 20 21 22 23 24
	?Palisades?	Kogruk				25 26
						27 28 29 30
						31
						32 33 34 35
						36 37 38
						39 40

8.	Tongue-shaped cores with striking platforms prepared by a burin blow	Yoshizaki 1959, Fig. 6, No. 18.
9.	Tongue-shaped cores with multi-fluted striking platform	Yoshizaki 1959, Fig. 16, No. 17.
10.	Agate-Basin-like projectile points	Yoshizaki 1959, Fig. 19, No. 17.
11.	Large contracting stem points	Yoshizaki 1959, Fig. 19, Nos. 9 to 12.
12.	Flake gravers	Yoshizaki 1959, Fig. 14, No. 4.
13.	Burins on broken artifacts	Yoshizaki 1959, Fig. 20, No. 24.
14.	End-of-blade scrapers	Yoshizaki 1959, Fig. 7, No. 27.
15.	Flat-topped end scrapers	Yoshizaki 1959, Fig. 15.
16.	Neatly chipped large plano-convex end scrapers	Yoshizaki 1959, Fig. 14, No. 10.
17.	Unifacial drill-like tools	Yoshizaki 1959, Fig. 26, No. 9.

The final pre-ceramic period is called the arrowhead horizon and just precedes the introduction of pottery. The Uenodarkita and Takei II sites with their small bifacial lenticular, triangular and lanceolate end blades (Serizawa and Ikawa 1960, Fig. 10-11) are uniquely like those in the Arctic Small Tool Tradition.

Following these pre-ceramic periods is the Neolithic of Japan with the Proto-Jomon, Early Jomon, Middle Jomon, Later Jomon, and Final Jomon and these in turn are followed by the Yayoi periods of the Bronze and Iron Ages (Kidder 1962). In a general way the Neolithic pottery has some trait similarities to early pottery of Alaska and the Yukon but there are many specific differences and it is less similar than that from Siberia. There are, however, a host of artifact similarities to the New World, but they are mainly in the later aspects of the Arctic Small Tool, Inuk, and North Pacific Traditions. Since de Laguna has already noted many of these similarities and since the later Northwest American traditions have little to do with our finds in the southwest Yukon, I shall merely list the appropriate resemblances. More intensive search of the literature will probably turn up more traits.

1. Denbigh-like burins, composite fish hooks, small chipped, lanceolate, lenticular, and contracting stem arrow points, bilateral fish spears, male harpoons, net sinkers, asymmetrical triangular points, notched stones, female harpoons with or without barbs and stem, slender barbed bone points, barbed fish spear side prongs, semi-subterranean houses, small notched and scraped, chipped ulus, linear and dentate and cordmarked grit tempered pottery, conoidal shaped pots, unifacial drills, chi-thos, planing grooved adzes, composite fishhooks.	Proto-Jomon
2. Fish gorges, chipped adzes, smooth edge stone saws, ground splitting adzes.	Early Jomon
3. Ground stones, burial eye sockets, check stamp pottery.	Middle Jomon
4. Unilateral multi-barbed fish spears.	Late Jomon
5. Cylindrical antler hammers, polished celts, stone with hole, planing and splitting adzes, tubular needle cases, bone wedges.	Final Jomon
6. Antler spoons, bone or antler combs, bow drill, oval stone lamps, ground slate end blades, scapular scrapers, a number of varieties of men's ground slate knives, slate ground or chipped ulus and grooved stones.	Yayoi
7. Semi-circular stone lamps, clay lamps, sitkula pottery.	Kuriles
8. Labrets, sinew-backed bow, circle and dot motif, complicated stamp pottery, iron engravers, clay lamps.	Iron Age

From many standpoints the similarities between Japan and the New World complement those between the New World and Siberia. Japanese similarities are strongest to the Northwest Microblade, Inuk, and North Pacific, and possibly Aleutian, traditions. Siberian similarities are greatest with British Mountain and Arctic Small Tool Traditions. There are similarities to Cordilleran in both areas. With these similarities in mind, let us examine the archaeological information from the Chukchee Peninsula which logically should be receiving a flow of traits from both the Pacific coast area, as well as the Arctic drainage area of Siberia.

Table 9

Distribution of British Mountain and Cordilleran Tradition Traits in Eastern Asia and Northwestern America

Japan and Mouth of Amur River Sites	Trans Baikal Sites or Complexes	Middle Lena Sites	Lower Lena-Kolyma Sites	Chuckchee Peninsula Sites	Link Traits
Tachikawa	Serovo	Kullaty			Ripple Flaking
Tachikawa				Krasino ?	Agate Basin-like Point
Jomon	Serovo				Leister Prong
	Serovo		Uolba I		Collateral Flaking
Tachikawa				Lake El'gytkhyn Cache	Burin on Artifact
	Verkholenskaya Gora	Shishkino	Uolba I	Krasino	Snub-nosed End Scraper
Osipovka	Verkholenskaya Gora			Lake El'gytkhyn Cache	Lerma Point
Osipovka	Afontova Gora	Shishkino ?		Lake El'gytkhyn Cache	Lerma-like (Cascades) Point
Osipovka	Afontova Gora	Shishkino		Lake El'gytkhyn Cache	Fort Liard Flake Burin
Osipovka	Afontova Gora	Shishkino		Krasino	Large Scraping Planes
Kamiyama	Afontova Gora	Shishkino		Yakitikiveem	Large Polyhedral Core
Kamiyama	Afontova Gora	Shishkino		Krasino	Large True Blade
	Mal'ta-Buret				Flat Pebble Pendant
	Mal'ta-Buret	Kullaty			Long Bone Needle
Osipovka	Mal'ta-Buret				Scale Scraper
Iwajuku	Afontova Gora	Shishkino	Chokurovka	Lake El'gytkhyn Cache	Crude Ovoid Biface
Kamiyama	Mal'ta-Buret	Shishkino	Uolba Burial	Lake El'gytkhyn Cache	End of Blade Scraper
Iwajuku	Mal'ta-Buret				Prepared Flake-like Blade
Tachikawa	Mal'ta-Buret			Yakitikiveem	Prepared Flake Graver
	Mal'ta-Buret	Chastino			Prepared Flake Knife or Scraper
	Mal'ta-Buret				Prepared Flake Lenticular Point
	Mal'ta-Buret				Prepared Flake (Projectile ?) Point
	Mal'ta-Buret				Prepared Flake Hooked Graver
	Mal'ta-Buret				Prepared Flake Central Burin
	Mal'ta-Buret	Chastino			Prepared Flake End Scraper
	Mal'ta-Buret				Prepared Flake Notched Scraper
	Mal'ta-Buret	Chastino			Mousterian-Like Discoidal Core
Iwajuku	Irkutsk Military Hospital	Shishkino			Pebble Chopper

Southwest Alaska Phases or Complexes	Seward Peninsula Phases or Complexes	Brooks Range Phases or Complexes	Northern Yukon Phases or Complexes	Southwest Yukon Phases or Complexes	Southwest Northwest Territories Phases or Complexes
	Denbigh	Naiyuk	Flint Creek	Champagne	Sandy Lake
	Denbigh	Kayuk	Flint Creek	Champagne	Sandy Lake
Kachemak I	Choris		Flint Creek		
Brook's River Gravel	Palisades II	Kayuk	Flint Creek	Champagne	Klondike
	Palisades II	Kayuk	Flint Creek	Champagne	Klondike
	Palisades II	Kayuk	Flint Creek	Champagne	Klondike
	Palisades II	Kayuk	Flint Creek	Kluane	Klondike
	Palisades II	Kayuk	Flint Creek	Kluane	Klondike
	Palisades II	Kogruk	Flint Creek	Champagne	Klondike
		Kogruk ?	Flint Creek	Kluane	
	Palisades II	Kayuk	Flint Creek	?	Klondike
	Palisades II	Kayuk	Flint Creek	Kluane	Klondike
			Flint Creek		
Kachemak I	Choris		Flint Creek		
			Flint Creek		Klondike
	Palisades II	Kogruk	British Mountain		Klondike
	Palisades II	Kogruk	British Mountain		
	Palisades I ?	Kogruk	British Mountain	Kluane	
	Denbigh	Kogruk	Flint Creek	Champagne	Klondike
	Palisades I ?	Kogruk	British Mountain		
			British Mountain		
		Kogruk	British Mountain		
			British Mountain		
			British Mountain		
		Kogruk	British Mountain		
		Kogruk	British Mountain		
	Palisades I ?	Kogruk	British Mountain		
	Palisades I ?	Kogruk	British Mountain		

To date, work in this area has been very superficial, but I believe there is some significant information, which for the most part has been overlooked. As yet, no stratigraphic excavations have been undertaken, but I believe a tentative or speculative cultural sequence may be established by typological considerations and seriation.

I find myself agreeing with Dikov (Chard 1960) and disagreeing with Okladnikov (Okladnikov and Nekrosov 1959) about the cache finds near the Lake El'gytkhyn area. I do not believe these are all cache blades, but a number of kinds of tools, most of which are not found on Neolithic sites. Following Dikov I believe that some are large, lenticular knife blades (Chard 1960, Fig. 5, Nos. 2 to 4), others are large, lenticular Lerma-like projectile points (Chard 1960, Fig. 5, No. 1), some are end scrapers or end-of-blade scrapers (Chard 1960, Fig. 6), some are side scrapers (Chard 1960, Fig. 8-9), and a few are burins made on projectile points or flakes (Chard 1960, Fig. 10). Not only does this complex occur at this site but similar points and knives occur at the Krasino site (Chard 1960a, Fig. 4), accompanied by large scraper plane-like tools. I suggest that this is a cultural entity having affiliations with the late Paleolithic of Siberia and Ocuhubka on the Asiatic Pacific coast. It is to be noted that there are some similarities to the American Cordilleran Tradition.

This complex is far different from that of the pre-ceramic Neolithic as found at the Lake El'gytkhyn lake shore site (Okladnikov and Nekrasov 1950), Yakitikieveem(Krader 1952), Vilka and Chikaevo (Chard 1960a: 125). All these latter sites are without pottery, but do have conical or cuboid polyhedral cores, fragments of small finely made bifacial end blades, microblades, blades, and often have small multi-burins made on unifaces or bifaces similar to the Denbigh-types of the Arctic Small Tool Tradition. Also appearing at some of these sites are burins made on blades or microblades, ripple flaked small bifaces, half-moon side blades, small gravers, ovoid bifaces, large leaf-shaped ripple flaked points and small triangular or lanceolate bifacial end blades. This assemblage includes many of the Asiatic Lena Neolithic stone tools but it lacks pottery. It could almost be classified in the Arctic Small Tool Tradition in the New World.

Before passing I would like to note that it is possible that there may be yet another complex which precedes this one. It includes blades, micro-blades, a tongue-shaped core, burins made on blades or flakes, large crude scrapers, but none of the Neolithic small bifaces. Dikov in his survey found these materials at the Iakitiki River site (Chard 1960a: 127) and the Anokatrara site (Chard 1960a: 125). Are they related to the Northwest Microblade?

Apparently there are sites which are later than the pre-ceramic Neolithic remains. These produce linear stamp or fabric impressed pottery and some of the early Neolithic stone tools. Sites in this category would be Ust-Belaia, Kameshkia, and a site at kilometer 102 on the Amguema (Chard 1960a). Some of these sites also have chi-tho-like tools, Denbigh-

like burins, microblades, small bifacial end blades, whetstones and large contracting stem points. These have been dated at about 1000 B.C.

The materials from Vakernaia 2 probably follows in cultural sequence. It is characterized by dentate stamp or cord impressed pottery and a number of traits that look like those in the North Pacific Tradition (Okladnikov and Nekrasov 1962). These include: the splitting and planing adzes, a bone mattock, an antler adze haft, chipped ulus, stone splitting wedges, ground slate or polished bone man's knife, ground slate ulus, and a stemmed slate end blade. I would guess these remains also occur before the time of Christ.

The final remains in the Chukchee Peninsula are of the Inuk period belonging to Okvik, Birnirk, and Punuk horizons (Chard 1960a).

All in all, the suggestions derived from the material in the Chukchee Peninsula are most encouraging and show many connections with the New World. Further, it would seem that all the culture remains are by no means confined to the Neolithic (Chard 1960). This brief perusal of the archaeological literature is reason for predicting that future investigations in the Chukchee Peninsula will yield remains which will figure significantly in the interpretations of the Americanists.

I have endeavored to align the sequences in northeast Asia tentatively in chronological order, with those of the New World (Table 8). With this rough correlation in mind, I believe it is worthwhile to consider again the Northwest American artifacts which are similar to those in Asia. These artifacts are set up in the Tables, 9, 10, 11 in approximtely the chronological order in which they first occur. I shall discuss them under three general categories: first, the Asiatic traits in the British Mountain, Cordilleran, and North Plano Traditions (Table 9); second, by types of Asiatic artifacts from the Northwest Microblade and the Arctic Small Tool Tradition (Table 10); and, finally, those in the Inuk, North Pacific and Denetasiro Tradition (Table 11).

There are a group of ten British Mountain traits which appear early in both northwest America and in eastern Asia. These include discoidal cores, prepared flake notched scrapers, prepared flake end scrapers, central burins made on prepared flakes, prepared flake hook gravers, prepared flake unifacial (projectile) points, prepared flake unifacial lenticular (projectile?) points, flake gravers, prepared flake side scraper or knives and prepared flake-like blades. In eastern Asia, this complex of traits is found only with Mal'ta-Buret materials, while in the relatively complete sequence in Japan it is absent, and pebble tools seem to appear at the same time period in North China.

On the basis of our present estimated dates, this complex seems to be earlier in Asia than the New World, and the question now comes is this an independent invention, or was there a diffusion from the Trans-Baikal through the Siberian Arctic drainage where the equivalent early periods have not yet been found? The Chastino materials from the Middle Lena, and the complexity of the assemblage of tools suggest the latter, but considerable more evidence from the intervening areas is neces-

Table 10

Distribution of Northwest Microblade and Arctic Small Tool Tradition Traits in Eastern Asia and Northwestern America

Japan and Mouth of Amur River Complexes	Trans Baikal Complexes	Middle Lena Sites	Lower Lena-Kolyma Sites	Chuckchee Peninsula Sites	Link Traits
Proto Jomon					Semi-subterranean House
Proto Jomon	Serovo				Small Notched End Scraper
Proto Jomon	Serovo	Kullaty	Uolba II	?	Laced Crack Repairing of Pots
Tachikawa	Kitoi		Uolba	Ust-Belaia	Abrading or Whetstone
Kuriles					Stone Lamp
Proto Jomon				Vakernaia	Toggle Female Harpoon
Proto Jomon	Kitoi		Uolba II	Vakernaia	Chipped Ulu
Proto Jomon	Serovo	Turukta	Uolba I	Ust-Belaia	Linear Stamped Pottery
Proto Jomon	Serovo	Turukta	Syalakh		Dentate Stamped Pottery
Proto Jomon	Serovo	Kullaty	Uolba I	?	Cord Marked Pottery
?	Serovo	Kullaty		Ust-Belaia	Fabric Impressed Pottery
?	Serovo	Ymyiakhtakh	Uolba I	Ust-Belaia	Fiber Tempered Pottery
?	Isakovo	Bestyakh	Syalakh		Rim Hole Decoration
Proto Jomon	Isakovo	Bestyakh	Syalakh	Ust-Belaia	Conoidal Pottery Vessel
Proto Jomon	Isakovo	Bestyakh	Syalakh	Ust-Belaia	Grit Tempered Pottery
Proto Jomon	Serovo	Bestyakh	Syalakh	Ust-Belaia	Coiled Pottery
	Kitoi	Kullaty	Chokurovka	Lake El'gytkhyn	Small Half Moon Side Blade
Proto Jomon	Glazkovo	Kullaty		Yakitikiveem ?	Small Lenticular Arrowpoint
	Serovo				Cylindrical Antler Hammer
	Serovo				Pointed Antler Flaker
Initial Jomon ?	Serovo				Chipped Adze
Proto Jomon	Serovo	Kullaty	Kestriryungka	Yakitikiveem	Small Lanceolate Arrow Point
	Isakovo			Vakernaia	Antler Mattock
		Ymyiakhtakh	Uolba II	Lake El'gytkhyn	Denbigh Burin
Proto Jomon	Isakovo	Kullaty	Uolba I		Small Contracting Stem Point
Proto Jomon	Isakovo	Kullaty	Uolba I	Ust-Belaia	Small Triangular Arrow Point
	Isakovo	Kullaty	Uolba II	Lake El'gytkhyn	Small Conical Core
	Isakovo	Turukta	Uolba II		Rectangular Bifacial Side Blade
?	Isakovo	Bestyakh	Kestriryungka	Lake El'gytkhyn	Cuboid Core
	Khin'skaya				Beaver Tooth Gouge
Proto Jomon	Isakovo	Bestyakh		Lake El'gytkhyn	Triang. Asymmetrical Tang Point
Initial Jomon	Serovo				Fish Gorge
Proto Jomon	Serovo	Kullaty			Notched Pebble Net Sinker
Shirataki	Glazkovo				Large Half Moon Side Blade
Tachikawa			Uolba II	Chirovoye	Large Contracting Stem Point
Proto Jomon	Khin'skaya				Unifacial Drill
Proto Jomon	Kitoi				Chi-tho
Tachikawa	Khin'skaya		Uolba I		Notched Microblade
Tachikawa					Rounded End Microblade
Proto Jomon	Khin'skaya				Pointed End Microblade
Tachikawa					Neatly Chipped Planoconvex End Scraper
Tachikawa ?	Khin'skaya	Kullaty	Chokurovka	Lake El'gytkhyn	Anaktuvuk Microblade Burin
Tachikawa	Khin'skaya	Bestyakh	Kestriryungka	Lake El'gytkhyn	Truncated Microblade
Tachikawa	Verkholenskaya Gora	Kullaty		Lake El'gytkhyn	Retouched Microblade
Tachikawa					Tongue Core Tachikawa Variety
Tachikawa					Tongue Core Shirataki Variety
Tachikawa	Verkholenskaya Gora	Shishkino		Ianitiki	Tongue Core
Proto Jomon	Verkholenskaya Gora				Bilateral Multi-barb Fish Spear

Southwest Alaska Phases or Complexes	Seward Peninsula Phases or Complexes	Brooks Range Phases or Complexes	Northern Yukon Territory Phases or Complexes	Southern Yukon Territory Phases or Complexes	Southwestern Northwest Territories Phases or Complexes
Katchemak Bay I	Old Whaling				
Katchemak Bay II	Old Whaling		Firth River		
			Firth River		
Brooks River Gravel	?	Natvakruak	New Mountain	Taye Lake	
Brooks River I	Old Whaling				
Brooks River I	Denbigh or Old Whaling				
Brooks River I	Old Whaling				
Brooks River Falls	Battle Rock or Choris		Buckland		
	Battle Rock		Buckland		
	Battle Rock		Firth River		
			Firth River		
Brooks River I	Battle Rock		Firth River		
	Battle Rock		Firth River		
	Battle Rock		Firth River		
Brooks River I	Battle Rock		Firth River		
Brooks River I	Battle Rock		Firth River		
	Denbigh	Natvakruak	New Mountain	Bennett Lake	
	Denbigh	Natvakruak	New Mountain		
			New Mountain	Taye Lake	
		Ipiutak	New Mountain		
Brooks River Falls	?	Anuktuvuk-Ipiutak	New Mountain	Taye Lake ?	
Brooks River Gravel	Denbigh	Natvakruak	New Mountain		
	Choris		New Mountain		
Brooks River Gravel	Denbigh	Natvakruak	New Mountain		
Katchemak Bay I	Denbigh ?	Natvakruak	New Mountain		
Brooks River Gravel	Denbigh		New Mountain	Bennett Lake	
			New Mountain		
			New Mountain		
	Denbigh	Natvakruak	New Mountain		
				Gladstone	
				Little Arm	
			Firth River	Gladstone	
Brooks River Falls	Denbigh	Tuktu	New Mountain	Little Arm	
Brooks River Gravel		Tuktu		Taye Lake	
Katchemak Bay I	Choris	Tuktu ?		Gladstone	Pointed Mountain
				Little Arm	
Kachemak Bay I	Palisades II	Tuktu ?	New Mountain	Little Arm	Pointed Mountain
	?		?	Gladstone	Pointed Mountain
	?	Tuktu	?	Little Arm	Pointed Mountain
	?		?	Little Arm	Pointed Mountain
Brooks River Gravel		Natvakruak		Little Arm	
	Denbigh	Natvakruak	New Mountain	Little Arm	Pointed Mountain
Aleutians	Palisades II (Kiana)	Tuktu	Late Flint Creek	Little Arm	Pointed Mountain
Aleutians	Palisades II (Kiana)	Tuktu	Late Flint Creek	Little Arm	Pointed Mountain
		Tuktu ?		Gladstone	
				Little Arm	
			Late Flint Creek	Little Arm	Pointed Mountain
Aleutians	Norton	Ipiutak	Joe Creek	Gladstone	

sary. Presently it is an intriguing problem. A subsidiary unsolved problem is how does British Mountain connect with the earliest American assemblages further south? At present there is a huge archaeologically unexplored area south of the present known distribution of British Mountain assemblages and north of the earliest human remains found in southernmost Canada, United States, and Mexico. Perhaps future exploration of this area will throw light on this problem. However, I suggest that a careful study of the flint technology, of some of the earliest tools and flakes from sites such as Tule Springs, Sandia, Lewisville, and Valsequillo of Puebla, keeping in mind the kind of materials from Mal'ta-Buret and British Mountain may reveal data pertinent to the problem even now.

Somewhat at variance with this distribution is the pebble chopper. It not only is found over a wider area in Asia, but it is apparently older than the above assemblages, and it has an even wider distribution in early assemblages in America. Is this a trait of a still earlier movement of culture and peoples from Asia to America?

Three other British Mountain traits must be considered separately. One is the prepared flake resembling blades which are found at Mal'ta-Buret and British Mountain but they also are found in Japan in Iwajuku. This still would appear to be a diffusion from the Trans-Baikal. End-of-blade scrapers have a wider distribution and a much longer time range but nevertheless these appear to be earlier in the Trans-Baikal. The final British Mountain trait, the very non-diagnostic crude biface, does not appear as early in the Trans-Baikal but it is early in Japan. This could easily have been invented more than once. However, one cannot help wonder if these do not move along with the pebble chopper from the Pacific drainage of Asia into the New World as well as westward across Asia.

Three Cordilleran traits, scale scrapers, long bone needles, and flat pebble pendants, again are much earlier in the Trans-Baikal than elsewhere, and they are usually associated with the Mal'ta-Buret-like materials. Why did they not arrive with the other British Mountain elements and appear in Cordilleran times?

Six Cordilleran traits, large true blades from large semi-conical polyhedral cores, large scraping planes, large burins made on flakes, flat Lerma-like points and Lerma-like (Cascade) points with a diamond shaped section appear in the Brooks Range, Firth River, southern Yukon, and Northwest Territory. Some of these traits appear in Palisades II where they may be carry-overs from earlier as yet unfound horizons, or they may be mixtures of a number of horizons. In eastern Asia these same traits appear to form a complex and they turn up at such sites as the mouth of the Amur, Verkholenskaya Gora, and Shishkino in the Lena areas, as well as in the Krasino and Lake El'gytkhyn cache in the Chukchee Peninsula. This appears to be a widespread northeastern Asia "Late Paleolithic" complex of Late Pleistocene or early Recent times which had considerable influence in the New World, particularly in the mountains of Alaska and Canada, at roughly the same time period.

Some of the other Cordilleran and Northern Plano traits such as snub-nosed end scrapers, burins made on artifacts, ripple and collateral flaking techniques, Agate Basin-like points and possible antler leisters, on present evidence, seem to be slightly earlier in the New World than the Old. It appears they eventually arrived in Asia very much later than the time when the earlier six Cordilleran traits entered the New World.

Is it not possible that while Cordilleran was forming in the New World and as new traits and peoples were flowing into it from Asia, a new complex further south in America was developing independently? This was characterized by spear points, flint knapping techniques and small snub-nosed end scrapers. In addition, does it not seem possible that some aspect of this development later moved north and was eventually integrated into Arctic assemblages?

The artifacts of the Northwest Microblade and Arctic Small Tool Traditions when compared with those of complexes in Asia, reveal a different picture (Table 10). There is a striking similarity of eighteen very specialized traits between the Northwest Microblade Tradition and the microblade tongue core horizons of Japan, Tachikawa and Shiritaki specifically. Four of these traits have been mentioned previously as they appear in Cordilleran earlier in the New World and seem to have spread from it, or from some complex like it, into Asia, to be integrated into the Japanese microblade cultures. Three of these traits, tongue cores, retouched blades or microblades and the bilateral barbed fish spear seem to appear first in the Paleolithic of the Trans-Baikal for example at the Verkholenskaya Gora site. They continued into the Japanese microlithic horizon. There is, of course, the possibility that they also were in an as yet unfound earlier horizon in Japan or the Amur or Mongolia at roughly the same time period. Regardless of this possibility, they did arrive in the New World later in the Northwest Microblade Tradition. Nine Northwest Microblade diagnostics seem to appear first in Japan. These are two specialized varieties of tongue cores, neatly chipped plano-convex end scrapers, microblades with rounded retouched ends, pointed microblades, notched microblades, burins made on microblades, truncated microblades per se, and unifacial drill-like tools. The last five of these are also present in Khin'shaya in the Trans-Baikal area. Other Japanese elements such as chi-thos, large half-moon side blades, and large contracting stem points also are found in Kitoi, Glazkovo, and Serovo in the Trans-Baikal long after their first appearance in Japan. One important Northwest Microblade element, the beaver tooth incising or gouging tool, seems to be early in Khin'shaya of the Trans-Baikal, but lack of preservation of bone in Japan casts doubt concerning its use as a good link trait. The notched pebble net sinker and fish gorge are found later in Japan and northern Asia than in Northwest America. The large contracting stem point in the Japanese material, also represents an interesting problem. It seems to be earlier there than in northwest America, but those in northwest America appear to have been derived from still earlier ones further south in the New World. Is this a case of independent inven-

Table 11

Distribution of Late Traits in Northwest America and Eastern Asia

Japan and Mouth of the Amur River Complexes	Trans-Baikal Complexes	Middle Lena Sites	Lower Lena-Kolyma Valley Sites	Chuckchee Peninsula Sites	Link Traits
Jomon					Plank Houses
Jomon					Mortar
Jomon					Bell-shaped Pestle
Kuriles					Sitkula Pottery
Yayoi					Ground Slate Triangular Harpoon Point
Kuriles					Ground Ulu Notched
Kuriles					Completely Polished Small Adze
Iron Age					Complicated Stamp Pottery
Iron Age	Kitoi				Circle and Dot Motif
Iron Age	Serovo				Sinew-backed Bow
Jomon	Glazkovo				Slat Armor
Jomon					Ground Ulu-Unnotched
Iron Age	Iron Age				Iron Engraving Tool
Jomon					Scapula Scraper
Iron Age					Labret
Jomon				Vakernaia	Bone Wedge
Jomon					Barbed Barbs for Fish Hooks
Jomon					Barbed Fish Spear Side Prong
Yayoi					Ground Slate End Blade Stemless
Yayoi				Vakernaia	Ground Slate End Blade with Barb
Yayoi				Vakernaia	Ground Slate End Blade with Stem
Iron Age					Clay Lamp
Japan					Lamp with Figure in Bottom
Kuriles					Semi-circular Stone Lamp
Yayoi or Jomon	Glazkovo				Bow Drill
Proto-Jomon			Uolba Il	Vakernaia	Planing Grooved Adze
Epi-Jomon				Vakernaia	Splitting Adze
Jomon	Glazkovo				Inlaid Burial Eye Sockets
Yayoi					Stone with Hole
Yayoi					Grooved Stone
Yayoi	Kitoi ?				Scapula Divining
Proto-Jomon					Notched Pebble
Proto-Jomon	Serovo				Composite Fish Hook
Jomon			Uolba II	Uelen Okvik	Large Check-stamped Pottery
Jomon	Glazkovo		Uolba II		Small Check-stamped Pottery
Jomon ?	Glazkovo			Vakernaia	Antler Adze Socket
		Bronze Age	Bronze Age	Uelen Okvik	Split Base Arrow
Yayoi	Glazkovo				Antler Spoon
Iron Age	Glazkovo				Combs
Early Jomon	Kitoi			Vakernaia	Smooth Edge Saw
Yayoi	Kitoi		Chokurovka	Vakernaia	Ground Slate Men's Knife
Epi-Jomon	Serovo				Ground Stone Fish Effigy
	Kitoi	Kullaty			Bone Whistle
Epi-Jomon	Isakovo	Kullaty	Bronze Age	Uelen Okvik	Tubular Needle Case

Southwest Alaska Phases or Complexes	Seward Peninsula Phases or Complexes	Brooks Range Phases or Complexes	Northern Yukon Territory Phases or Complexes	Southwest Yukon Territory Phases or Complexes
Kachemak IV				
Kachemak IV				
Kachemak IV				
Kachemak IV				
	Norton			
Kachemak I				
Kachemak II	Norton			
	Birnirk			
Kachemak Bay	Birnirk			
		Nunamiut		
Kachemak I	?			
Kachemak I	Norton			
	Ipiutak			
Kachemak I	Choris			
Kachemak I	Choris			
Kachemak I		Ipiutak	Joe Creek	
Kachemak I				
Kachemak I		Ipiutak		
Kachemak I	Norton			
Kachemak I	Norton			
Kachemak I	Norton			
Kachemak IV				
Kachemak III				
Kachemak I				
Kachemak I	Choris	Nunamiut	Joe Creek	
Kachemak I				
Kachemak I				
Kachemak III	Ipiutak			
Kachemak I				
Kachemak I				
Kachemak I	Choris			
Kachemak I				
Kachemak I	Norton ?			
	Old Bering Sea			
	Choris-Norton		Cliff	
Kachemak I	Choris			
Kachemak I	Choris	Trail Creek	Joe Creek	
Kachemak II		Nunamiut	Joe Creek	
	Norton		Joe Creek	
Kachemak II	Choris			Bennett Lake
Kachemak I	Choris		Joe Creek	
Kachemak Bay	?			
Kachemak Bay	Norton ?			
Kachemak I	Norton			

tion or is it not possible that earlier ones will yet be found in Northwest America from which we can derive the Japanese point types?

On a more general level it appears that there was a nexus between Japan, Pacific Coast of Asia, and America at the time of the Northwest Microblade Tradition. Many of the elements of the Northwest Microblade Tradition appear to have been first formed as a culture complex in the general area between northern Japan and outer Mongolia. From this center a few elements trickled up into the Trans-Baikal during the Khin'shaya stage, and even a few flowed into the other parts of Siberia in the Arctic drainage, but the evidence suggests that a large proportion came into America via the Pacific coastal area. It should be noted that all the flow was not one way, for some of the elements of the Japanese microlithic came from earlier America cultural centers and some of the Northwest microblade traits turn up later in Siberia. Again, however, there seems to have been a shift in the area from which elements in the New World were derived, but again this shift may be more apparent than real, for our knowledge of culture complexes of the later microblade horizon is scanty in Siberia.

One triangular projectile point with an asymmetrical tang was found in one Little Arm component. If this is not an aberrant artifact, then there may be a Northwest Microblade connection with Isakovo of the Trans-Baikal and complexes of the northern Siberia area. Generally speaking, however, the greatest cultural connections of the Siberian Arctic drainage are with the Arctic Small Tool Tradition. Cuboid and small conical polyhedral cores, small rectangular bifacial side blades, small triangular arrow points, small contracting stem arrow points, antler mattocks, and chipped adzes all are found in the Isakovo of the Trans-Baikal which seems to be earlier than the Arctic Small Tool. These also seem earlier than any in Arctic Siberia. Arctic Small Tool traits, such as small lanceolate arrow points, pointed antler flakers, notched end scrapers, and cylindrical antler hammers, occur in Serovo in the Trans-Baikal as well as in Arctic Siberia. The small contracting stem, small triangular, lanceolate and lenticular points often with ripple flaking, and the chipped adze do, however, occur in the Proto-Jomon period in Japan which has been dated far earlier (7000 B. C.) than either the Siberian or New World complexes with similar traits. Thus it may be possible that the earlier Japanese elements spread first to Siberia and then integrated into a complex which later spread to the Arctic Small Tool Tradition of America. Small lenticular bifacial arrow points often with serrated edges, small half-moon bifacial side blades and Denbigh-type multi-burins and perhaps burin spall tools, are Arctic Small Tool traits that appear to be earlier in America than in northern Asia.

In the latter more poorly defined and more indefinitely classified part of the Arctic Small Tool Tradition, the New World received from Asia a series of elements or traits perhaps only in the form of ideas, which were part of the ceramic industry. These elements include pottery with grit temper, manufacture by coiling, conoidal vessel form, vessels with

rim hole decoration, fabric impressed, cord marked, linear stamp, dentate stamp and check stamped surface finish and lace crack repairing. Most of these traits are earlier in Japan than in Arctic Siberia. However, the absence in both Siberia and America of many of the other complex ceramic traits in Japan suggests that the northern New World initially received its pottery from Arctic Siberia, although Siberia may have originally received its ceramics from the more complex Japanese and Chinese ceramic traditions.

Four traits, all dubiously linked with the Arctic Small Tool Tradition and all possibly late additions, may have come directly to America via the Pacific coast. These are toggle-headed harpoons, chipped ulus, stone lamps, and abrading or whetstones.

The gradual flow of traits from the Pacific coast of Asia which began in the Northwest Microblade Tradition later shifted into a movement from Siberia into the early Arctic Small Tool Tradition. It in turn seems to move back to a flow from the Pacific coast during later Arctic Small Tool Tradition times and continues in the following traditions.

Of the final three traditions, the Inuk and North Pacific have many resemblances to Asia while the more poorly known Denetasiro has only a few and even these may have come from the other two traditions (Table 11). Only tubular needle cases (Isakovo), ground stone fish effigies (Serovo), and sinew backed bows (Serovo) appear to be earlier in the Trans-Baikal than in Japan or the Pacific coast. In the New World many of the other traits which are Japanese or Pacific coast elements appear first in either Choris or Kachemak Bay I. Only combs, check stamp pottery, complicated stamp pottery, antler spoons, split bone arrows, clay lamps, and iron engraving tools appear to be earlier in the Inuk Tradition. Composite fish-hooks, smooth edge saws, antler adze sockets, scapula scrapers, the bow drill, labrets, scapula scrapers, bone wedges, and inlaid eye disks in burials seem to arrive at about the same time in both North Pacific and Inuk Traditions from the complexes on the Pacific coast of Asia. Notched pebbles, grooved stones or plummets, stones with holes in them, the splitting and grooved planing adzes, completely polished adzes or celts, semi-circular stone lamps, stone lamps with effigies on their bottoms, ground slate notched or unnotched ulus, ground slate end blades with stems but no barbs, ground slate end blades with barbs and stems, ground slate stemless end blades, ground slate triangular end blades, bone whistles, barbed barbs for fish hooks, barbed fish spear side prongs, slat armour, the circle and dot decoration motif, bell-shaped pestles, mortars, plank houses, and Sitkula pottery arrive first in southwest Alaska from the Asiatic Pacific coast. It, however, must be noted that the ground slate tools (ulus, men's knives, end blades, etc.) which appear in Yayoi of Japan may not be much older than similar types in the New World. In view of these observations, there is the possibility that most of the traits mentioned above diffused from Asia to America, but the ground slate industry may have been diffused in the opposite direction so that the flow of culture at this particular time was moving in both directions.

Some of these traits appear to have been passed on to the Inuk Tradition from the North Pacific Tradition at a later time. The interior Denetasiro Tradition may have acquired its ground slate, fish spears, scapula scrapers and the like from the same source in Alaska. Later, the Bering Strait area and the northern Siberia coast were probably invaded by Inuk groups such as Old Bering Sea, Birnirk, and Punuk who in all probability developed in the New World.

During this time period one gets the feeling that there was a steady flow of peoples and traits up the Asiatic Pacific coast into the New World, with most of this flow being integrated into cultural complexes developing in southwest Alaska. Only a few traits went into the development going on north of Bering Strait, but later some of the traits which had been acquired in southwest Alaska were integrated into the developing Inuk Tradition north of Bering Strait.

In the preceding pages, the relationships of the various archaeological complexes in northwest America have been examined, and some of the resemblances in their artifacts to those in eastern Asia have been noted. Much of the archaeological information concerning the basic cultural units of each sequence is very inadequate, the dating of most of the sequences is very poor, and there are huge geographical areas from which we have little or no archaeological data. In spite of these very great limitations, some relationships appear to be significant at the present time, and I believe they may be used as the basis for setting up hypotheses to account for how the northern cultural traditions came into being and how they spread. I also believe that such hypotheses may be indicative of the overall cultural process involved in the peopling of the New World. It is obvious that these speculations must be tested by further research. As new data accumulates the whole body of it must be re-analyzed to redefine existing hypotheses. However, never having been accused of treading like an angel, let me rush forward!

It is most difficult to speculate about the origin and spread of the ill-defined and undated British Mountain Tradition. Not only do we not know whether there is any earlier culture in the northern part of the New World, but the only components known so far are found in a very small region. A number of artifacts of this tradition have been noted as similar to those in the Mal'ta-Buret complex of the Trans-Baikal region of Siberia. These similarities suggest that this Asiatic culture, or one similar to it, is possibly involved in the origin of the British Mountain Tradition.

Only when we come to the Cordilleran Tradition do we have enough information to speculate about the origin and spread of a New World culture complex. Because most of its components are found in the northwestern mountainous regions and because one of its complexes is Kayuk, in the Brooks Range, I surmise it came into being in the general western Brooks Range area, near Bering Strait. Dates from some of its southern and possibly later components suggest that it came into being between 10, 000 and 15, 000 years ago, when glaciers probably still existed in the mountains, when the vegetation may have been mainly tundra with willows and shrubs

on the valley flanks, and when the big game of the Pleistocene epoch possibly was still roaming about in the north. It seems probable that the British Mountain Tradition, or a descendant of it, was already in the area of origin of this new tradition. This newly developing Cordilleran Tradition maintained certain of the older British Mountain elements, such as: pebble choppers, thick and thin side scrapers, flake gravers, bifacial knife blades, bone awls, notched or spokeshave-like scrapers, end-of-blade scrapers, and perhaps the use of blades struck from conical polyhedral cores. Fused with these older type tools, and replacing other older traits are a series of elements that flowed in from Asia. Perhaps pebble pendants, scale scrapers, long bone needles, and prismatic blades came in earlier from something like Mal'ta-Buret. Lerma-like lenticular bifacial (projectile?) points, truncated blades, large conical polyhedral cores, split pebble choppers, Fort Liard flake burins, and large scraper planes appear to have come in later from the widespread late Paleolithic horizon of eastern Asia. Certain elements, such as snub-nosed end scrapers, may have been derived from earlier cultures already in existence further south in the New World. The collateral and ripple flaking technique, found apparently late in the Cordilleran Tradition, may have come from a similar source. The unilateral multi-barbed antler fish spear or leister of the Cordilleran complex may have been a New World invention based upon Asiatic concepts involved in the bilateral multi-barbed fish spear. The Flint Creek multi-burins and the burins made on artifacts may have been based on concepts in the Asiatic-derived flake burins. The sinew stones and antler bi-pointed fish gorges seem to be original New World inventions. All these elements from a variety of sources did, however, coalesce and form a tradition. One may speculate that this tradition was well adapted to a semi-glacial, mountainous environment but in exactly what manner we do not fully understand. However, camps in such an environment appear to have been established in mountain valleys, on terraces along the narrows of streams, where big game could have crossed, where fish might have been easily caught, and where alder and willow were available.

The distribution of sites in this tradition, four on the Noatuk in the Brooks Range, with two near Anaktuvuk Pass, nine in the Firth River region, one at Kluane Lake, one near Fort Liard, one at Fraser Canyon, British Columbia, and others in Washington and Oregon seem to be in the same kind of ecological niche, and may show the route of the spread of this tradition.

Following the Cordilleran Tradition in many parts of the north is one called Northern Plano, formerly called Yuma (MacNeish 1959). Earlier dates for similar materials in the more southerly Plains-Prairie region and the lack of many newly derived Asiatic traits suggest it formed in the Great Plains or Prairies to the south, and spread northward replacing the Cordilleran in parts of the northwest (Fig. 83b). From the Cordilleran Tradition it was replacing in the north, or perhaps from a similar culture that had formed in the south, Plano may have acquired the flake

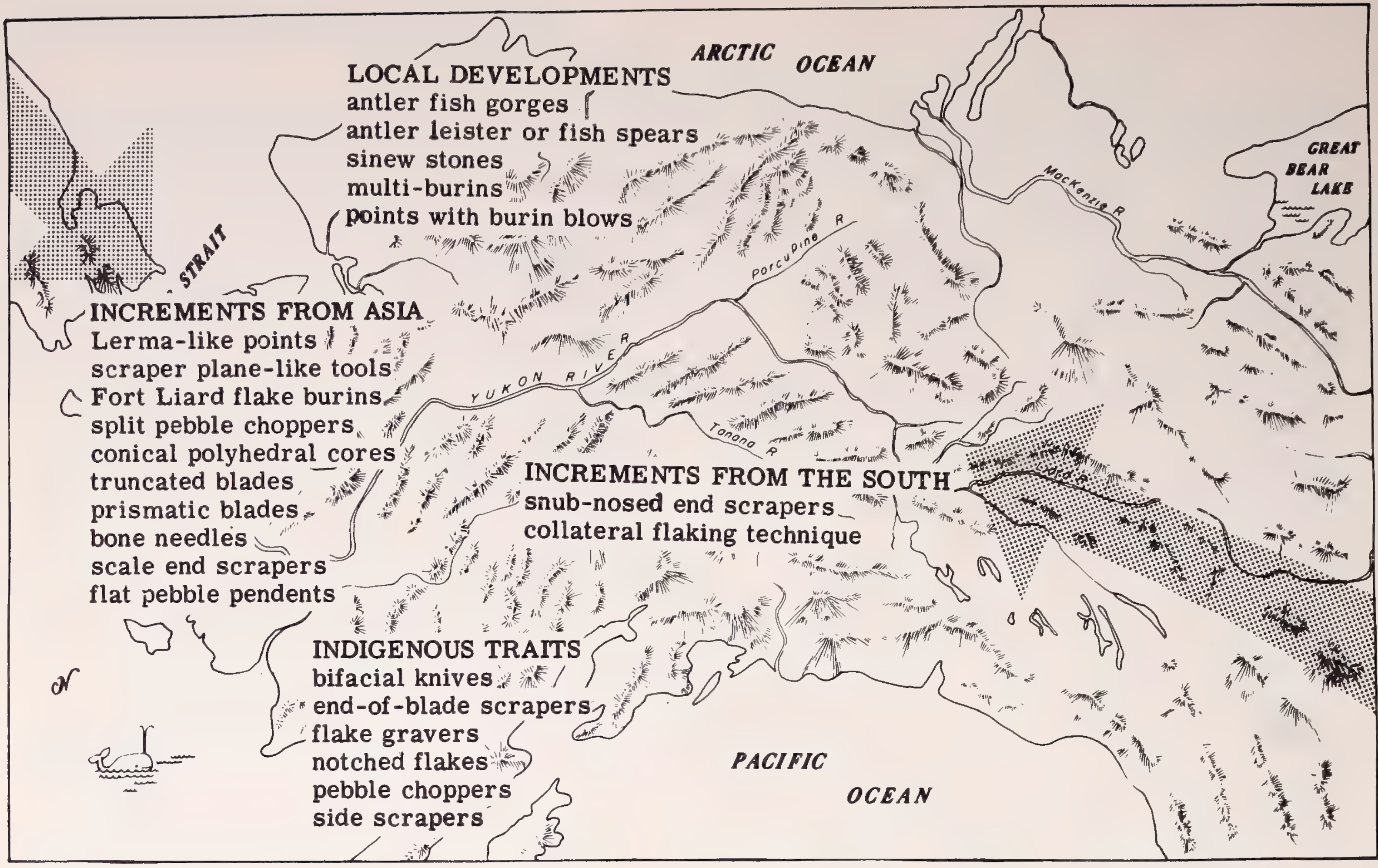


Fig. 83a. The Formation of the Cordilleran Tradition.

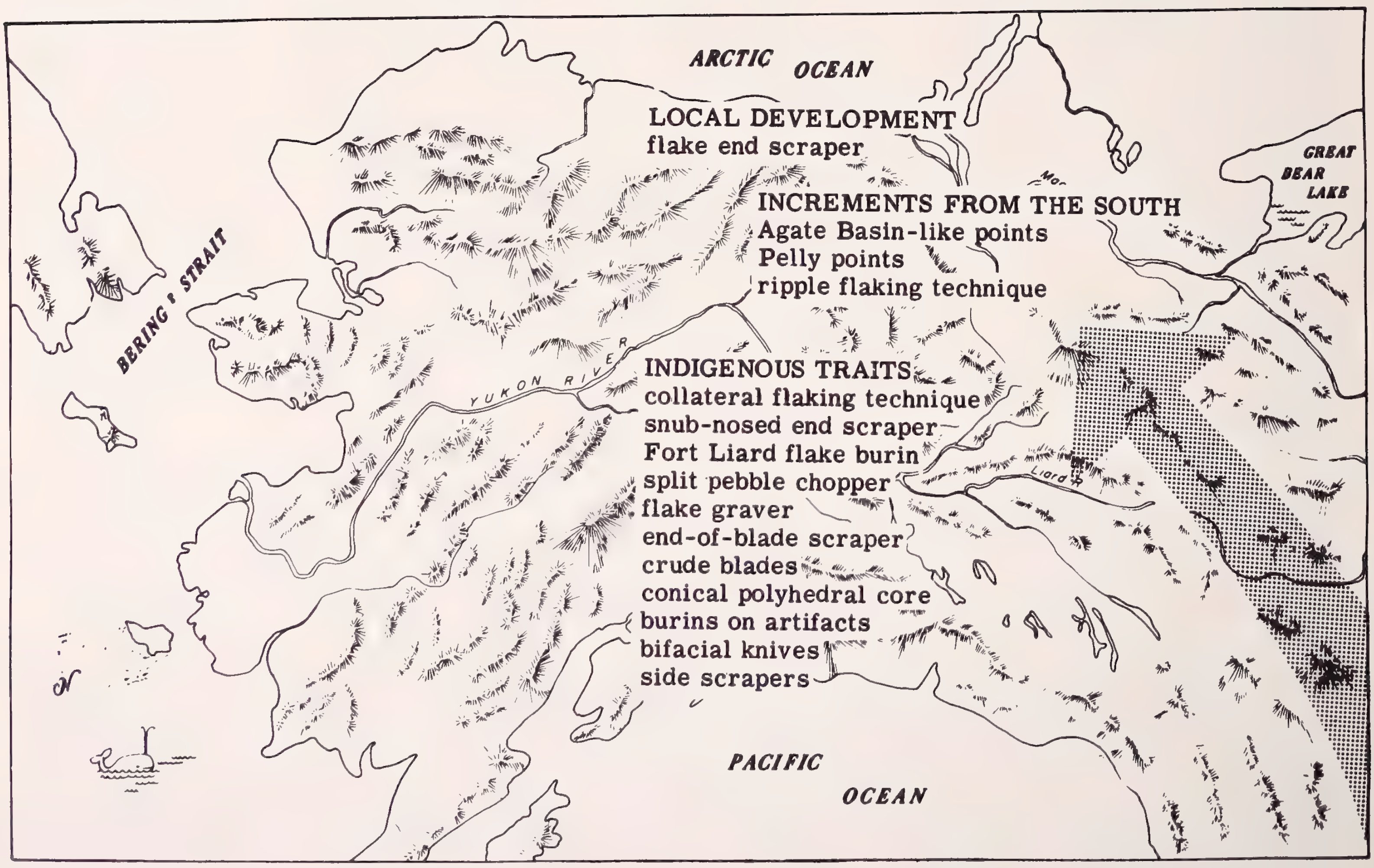


Fig. 83b. The Formation of the Plano Tradition.

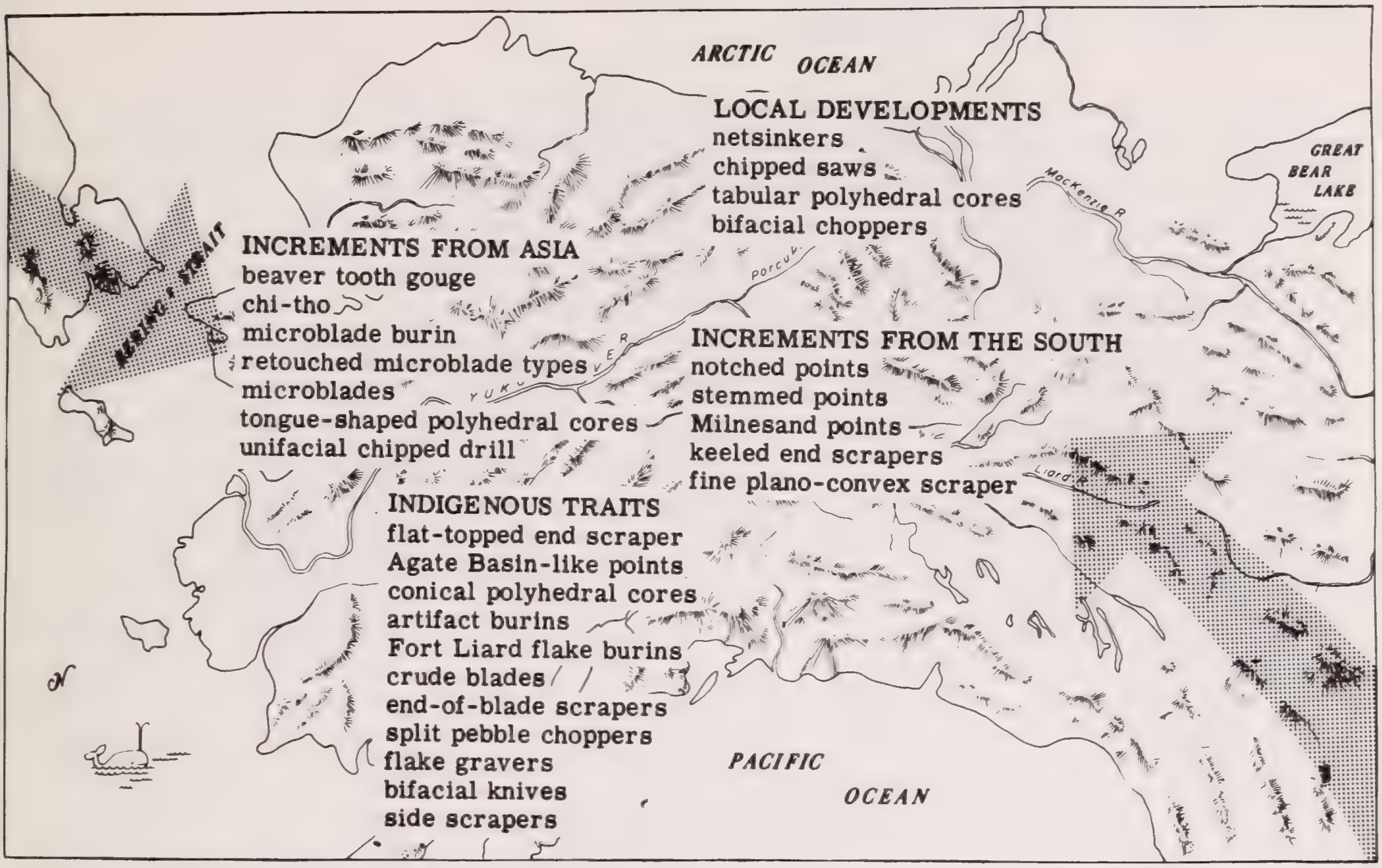


Fig. 84a. The Formation of the Northwest Microblade Tradition.

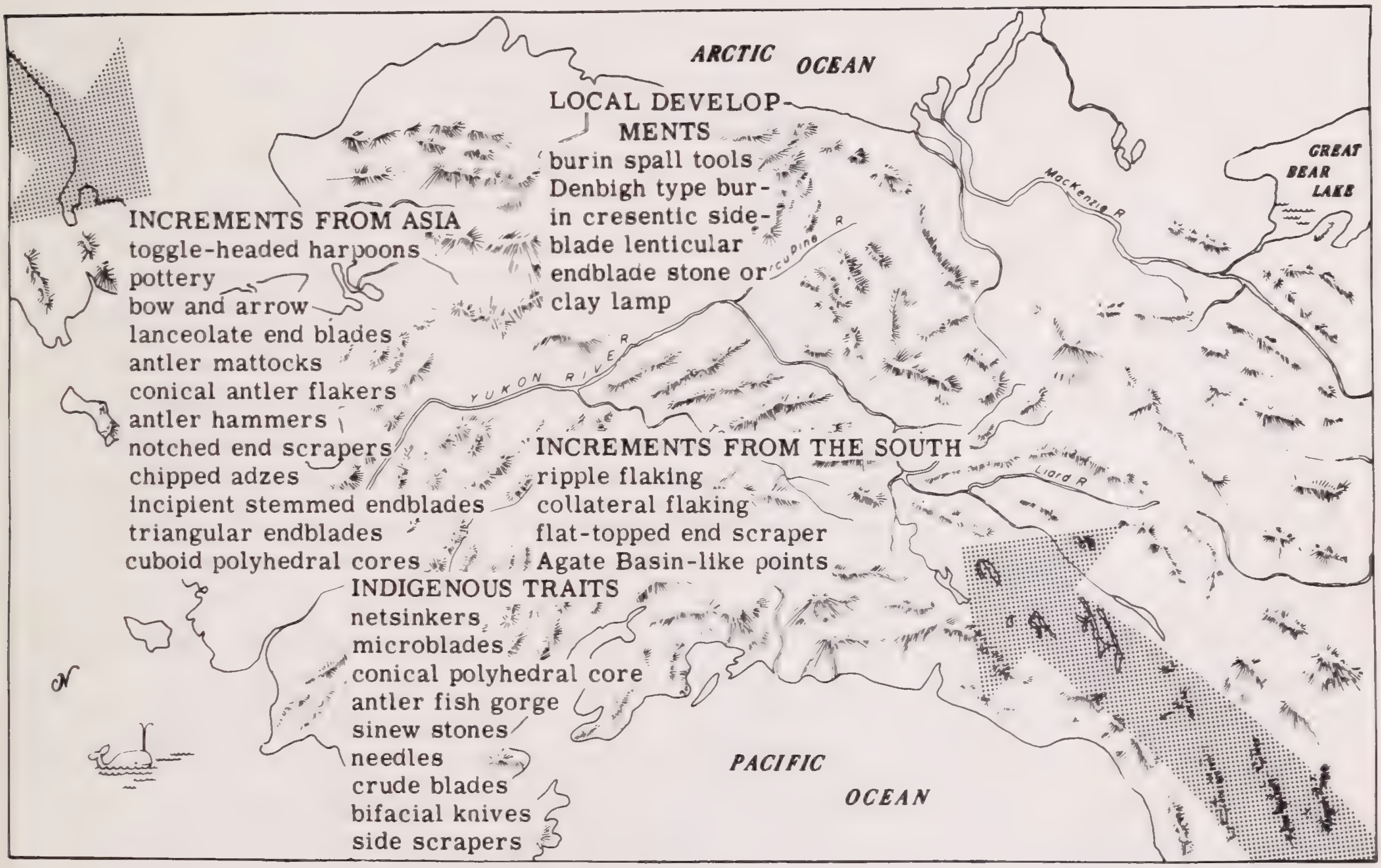


Fig. 84b. The Formation of the Arctic Small Tool Tradition.

gravers, split pebble choppers, blades, side scrapers, end-of-blade scrapers, snub-nosed end scrapers, burins on artifacts, Fort Liard burins, collateral flaking, and ovoid bifaces. Traits which originated in the south and which were also an integral part of the tradition include Agate Basin points, Pelly points, and the ripple flaking technique. The only probably local invention was the flake end scraper sometimes with lateral graver spurs, but even this is an obvious variation on the same theme as the snub-nosed end scraper.

Basically, I see the Plano Tradition representing a way of life and a manner of subsistence adapted to buffalo hunting in a Plains-Prairie environment. It may have originated in the south between about 6000 and 10, 000 B. C. when the glaciers were retreating. During the glacial retreat, the grasslands with their faunal assemblage crept into parts of the north, replacing the tundra, willow, and alder environment. Then, following the buffalo, came the culture and people of the Northern Plano Tradition to replace the Cordilleran Tradition by migration, amalgamation, and diffusion. In areas such as the Fraser Canyon and perhaps the Bering Strait and the Firth River, where the new environment did not penetrate, the older Cordilleran Tradition may have continued. Except for the diffusion of certain elements like ripple flaking and the Agate Basin point, Plano does not appear to reach Bering Strait, and so it only indirectly affects a developing tradition there. This latter was receiving a steady flow of people and ideas from Asia.

Following the short-lived Northern Plano Tradition in Alaska and in the southern Yukon, but in part contemporaneous with its representative to the east, was the Northwest Microblade Tradition. From what meager archaeological evidence is available, I surmise that perhaps even as the Plano Tradition spread into the Northwest, Asiatic traits or other traits and adaptations were being acquired at or near Bering Strait (Fig. 84a). Thus, by the time of the beginning of the Hypsithermal period when the boreal forest became dominant in much of central Alaska and the Yukon, this accumulative cultural process culminated in the establishment of a new tradition -- the Northwest Microblade Tradition. This coalescence probably occurred somewhere in southwest central Alaska about 5500 B. C. The Northwest Microblade Tradition had acquired from the resident or neighboring populations, for example Cordilleran, such traits as conical polyhedral cores and blades, end-of-blade scrapers, split pebble choppers, artifact burins, Fort Liard burins, side scrapers, and ovoid bifaces. Perhaps, too, a few of the above items came from the Plano complex. Certainly the Agate Basin points, snub-nosed end scrapers, and gravers were derived from Plano. Notched and stemmed points may also have come from the south. The flow across Bering Strait from Asia and, I suspect, ultimately from the North China-Mongolia-Japan general region (Maringer 1950; Yoshizaki 1959) contributed such items as the unifacial drill, the two variants of the tongue-shaped polyhedral core, and notched microblades, pointed microblades, microblades with rounded ends, and microblades with one or two edges retouched. From Asia came

as well Anaktuvuk microblade burins, neatly chipped plano-convex end scrapers, and perhaps the asymmetrical tanged small triangular arrow (?) point and chi-tho. Later manifestations of the Plano complex gave the Milnesand and Plainview points. Invented locally were net sinkers, gill nets (?), tabular polyhedral cores, flint saws, and perhaps chi-thos, unless as suggested, the latter had Asiatic origins.

The Northwest Microblade Tradition, which had a subsistence based on summer lake fishing and winter hunting and trapping, was somehow well adapted to the boreal forest. The gill net, if it was present, or other devices for lake fishing, and adzes for cutting trees are examples of tools making for forest adaptation. After its original coalescence somewhere in western Alaska, the tradition began to spread into extended parts of the boreal forest such as Anaktuvuk Pass, the Liard and upper Mackenzie Valleys, much of northern British Columbia and perhaps even northwest Alberta. During the development of its final stages it even extended as far south as the State of Washington, and as far east as the Barrenlands of the Northwest Territories. In both these areas, it probably was replacing remnants of the Cordilleran and Plano Tradition, and taking on new traits from adjacent areas such as projectile point types from the eastern Archaic.

The next tradition in the northwest is the Arctic Small Tool Tradition. It was probably created about 4000 B. C. in the tundra region, near Bering Strait on either the Asiatic or American side. The Northwest Microblade Traditionwas already in this area with such traits as sinew stones, needles, fish gorges, microblade burins, net sinkers, flat-topped end scrapers, large bifacial knives, blades, microblades struck from conical or tongue-shaped cores, and the ripple and collateral flaking techniques. When newly formed, the Arctic Small Tool Tradition continued to use these traits, but shortly discarded, replaced, or readapted others and established the new tradition. New traits were gradually acquired from Neolithic cultures of northeastern Siberia within the Arctic drainage such as small triangular, lanceolate, and incipient stemmed end blades, cuboid polyhedral cores, conical antler flakers, notched end scrapers, bows and arrows, chipped adzes, antler hammers, antler mattocks, and later, various kinds of ceramics. The tradition also may have acquired from the Asiatic Pacific coast cultures the stone or pottery lamp, and the toggle-headed harpoon. The people practicing this tradition probably invented the half-moon side blade, this being an adaptation of the Asiatic rectangular side blade and also the Denbigh-type burin and burin spall tools. This distinctive burin type possibly was derived from the basic ideas involved in early New World types such as the Flint Creek multi-burin. They also probably conceived their idea of the lenticular end blade with its serrated edges from earlier Siberian types.

Eventually, however, all these traits, from a variety of sources, were welded together into a complex that was well adapted to the tundra region within the Arctic drainage (Fig. 84b). Animal bones and site distributions suggest a subsistence based on caribou hunting, while the harpoon,

seal bones, and coastal site locations suggest this economy was supplemented by the exploitation of some of the oceanic resources. Its big movement across the Canadian Arctic seems to have commenced about 2500 B. C.,and by 1500 B. C. the tradition was well established in Ungava and Greenland. The group moving toward the east maintained and elaborated the earlier basic complex, and probably developed traditions like Dorset at the time the westerly groups were receiving a steady flow of items from Asia. These Asiatic increments included pottery, antler bifurcated base foreshafts, semi-subterranean house types, antler spoons, combs, male harpoons, and others. Some of these were readapted, some were integrated into the tradition, and some ceramic concepts passed through the culture and were integrated into other traditions such as Eastern Woodland.

The inflow of traits from the Asiatic Pacific coast continued to change the later parts of the Arctic Small Tool Tradition, especially in the general western American Arctic coastal area, from the Seward Peninsula to the mouth of the Mackenzie. By Choris times, about 1000 B. C., cultural changes were sufficiently widespread so that a new tradition, Inuk, was formed (Fig. 85a).

Some of the traits directly from Asia were sinew backed bows, combs, labrets, the bow drill, the man's ground slate knife, and the pottery lamp. Other traits flowing in possibly from the Asiatic Pacific coast and which may have first gone to the North Pacific Tradition before being integrated into the newly formed Inuk Tradition were ulus, triangular end blades, stemmed end blades, and barbed end blades -- all made from ground slate -- and barbed bone or antler arrow foreshafts, and needle cases. Older traits, such as toggle-headed harpoons, semi-subterranean houses, pottery and large chipped contracting or stemmed spear points would have continued, but they underwent many changes due to internal developments or outside influences. Some older Arctic Small Tool traits continued to be used relatively unchanged such as bone or antler mattocks, the bow and arrow, antler adze sockets, chipped half-moon side blades, the chipped adze, fish gorges, leisters, needles, net sinkers, and chipped end scrapers. Invented locally by Inuk, in response to the harsh Arctic environment, were bone or antler snow shovels, bone or antler snow goggles, ice creepers, sled and dog sled equipment, and Kayak equipment. Ground slate side blades were probably a new adaptation of the older chipped ones. This accumulative process of accepting new traits, adaptations, and inventions which occurred between 1000 B. C. and A. D. 500 in the western Arctic eventually culminated in the new Inuk Tradition which appeared to be better adapted to the Arctic coast than its predecessors. Thus, at about A. D. 600 this complex and its people began to spread rapidly in this environment, so that by A. D. 1000 the tradition extended from northern Alaska as far east as Greenland and subsequently it spread into the maritime tundra regions of Newfoundland.

My understanding of the origin and spread of the North Pacific Tradition (Fig. 85b) is very much less specific than for that of Inuk. The

basic difficulty is that very much less investigation has been undertaken. Further, we do not know what cultural complexes existed before Kachemak Bay I.

Apparently traits carried on into the North Pacific Tradition from the as yet undiscovered earlier horizons which were perhaps like the Arctic Small Tool Tradition are boulder chip scrapers or chi-thos, abrading stones, small chipped lanceolate and lenticular end blades, chipped adzes, semi-subterranean houses, chipped ulus, oval stone lamps, and toggle-headed harpoons. Integrated with these older traits were a whole series of importations from the Pacific coast of Asia. These included notched and grooved pebbles, scapula scrapers, composite fish hooks, tubular needle cases, the bow drill, the splitting adze, ground planing adzes, bone of antler wedges, antler adze socket or hafts, plank houses, smooth edged saws, stones with holes, half-moon lamps, specialized clay lamps, barbed fish spear side prongs, and Sitkula pottery. Barbed antler arrow foreshafts and ice picks may have also come from Asia but just as well could have come from Inuk or even Denetasiro. Labrets, ground slate men's knives, ground slate trinagular end blades, ground slate stemmed end blades, ground slate barbed end blades, ground slate notched ulus, and ground slate unnotched ulus, also, are basic parts of the tradition. Whether these are local inventions, or come from some unknown center in eastern Asia or whether they move up from the south along the Pacific coast, is difficult to decide at present. On current evidence I would suspect it is the latter and that these traits later spread into Asia. Local inventions or developments were barbed barbs for fish prongs, bone drill bits, use of pumice, a complex connected with specialized seacraft and a set of specialized burial practices.

Sometime during the period between 2000 to 1000 B. C., this accumulation of traits and concepts coalesced in southwest Alaska. This North Pacific Tradition was somehow well adapted to the fiord-like region of the American north Pacific coast, and may have spread southward through it. The tradition seems to have been adopted by a number of linguistic groups within this environment.

The final tradition, Denetasiro, is even less well known and the steps immediately leading to its development have not been found (Fig. 88). Many of the Denetasiro traits existed earlier in the region, in the Northwest Microblade Tradition. These included ovoid bifaces, bone needles, snub-nosed end scrapers, antler fish gorges, abrading stones, antler leisters, pebble net sinkers, chi-thos and beaver tooth gouges. Some of its traits such as Stott, Prairie and Catan arrow point types may have come from the south, although the idea of the bow and arrow may have existed earlier in the Arctic Small Tool Tradition. Barbed antler fish spears and fish prongs, fish hooks, and the three-quarter grooved polished planing adzes may have come to Denetasiro from the North Pacific Tradition which, in turn got them from Asia. The multi-barbed unilateral antler arrow point may have been a Denetasiro invention based

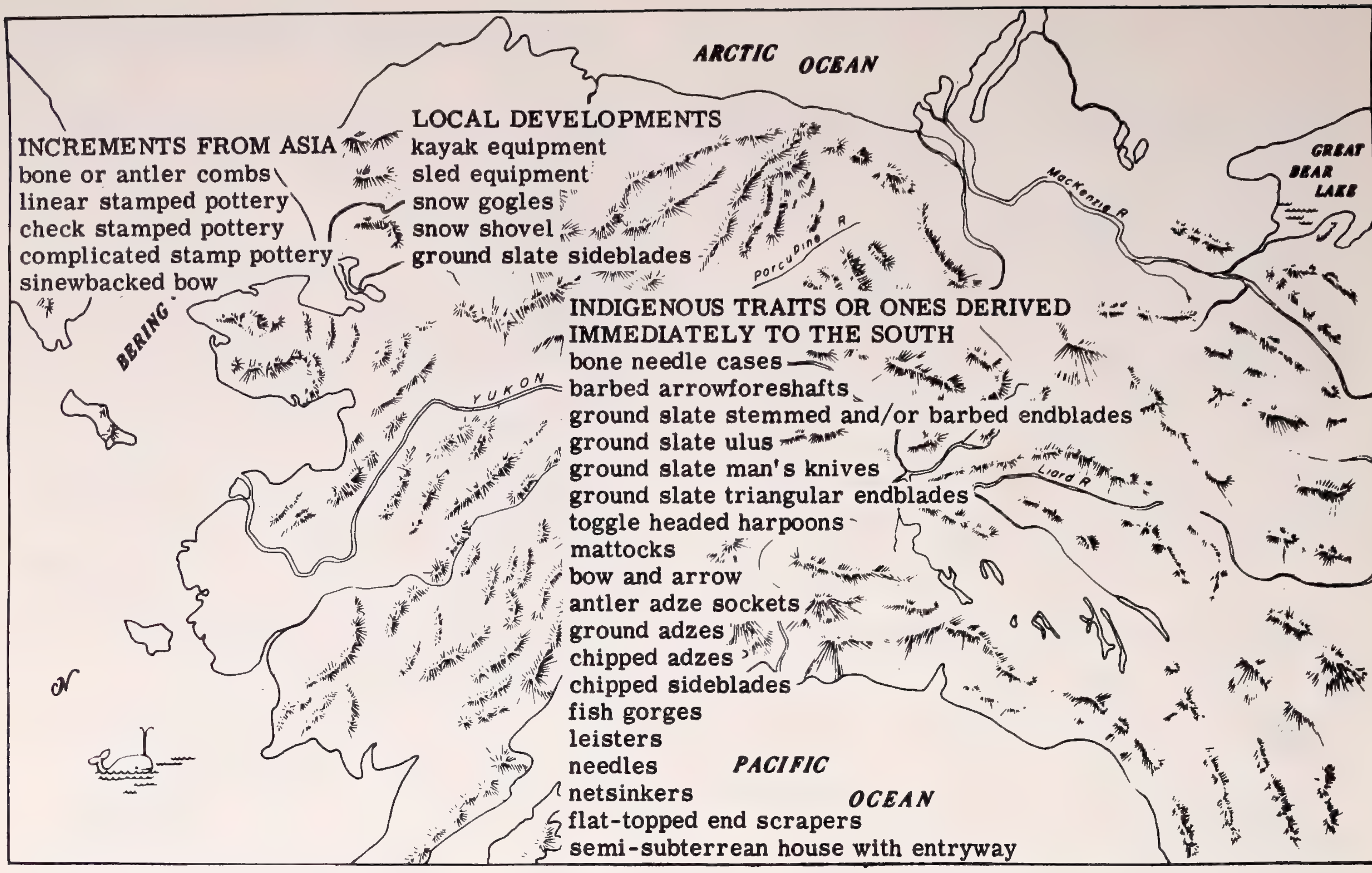


Fig. 85a. The Formation of the Inuk Tradition.

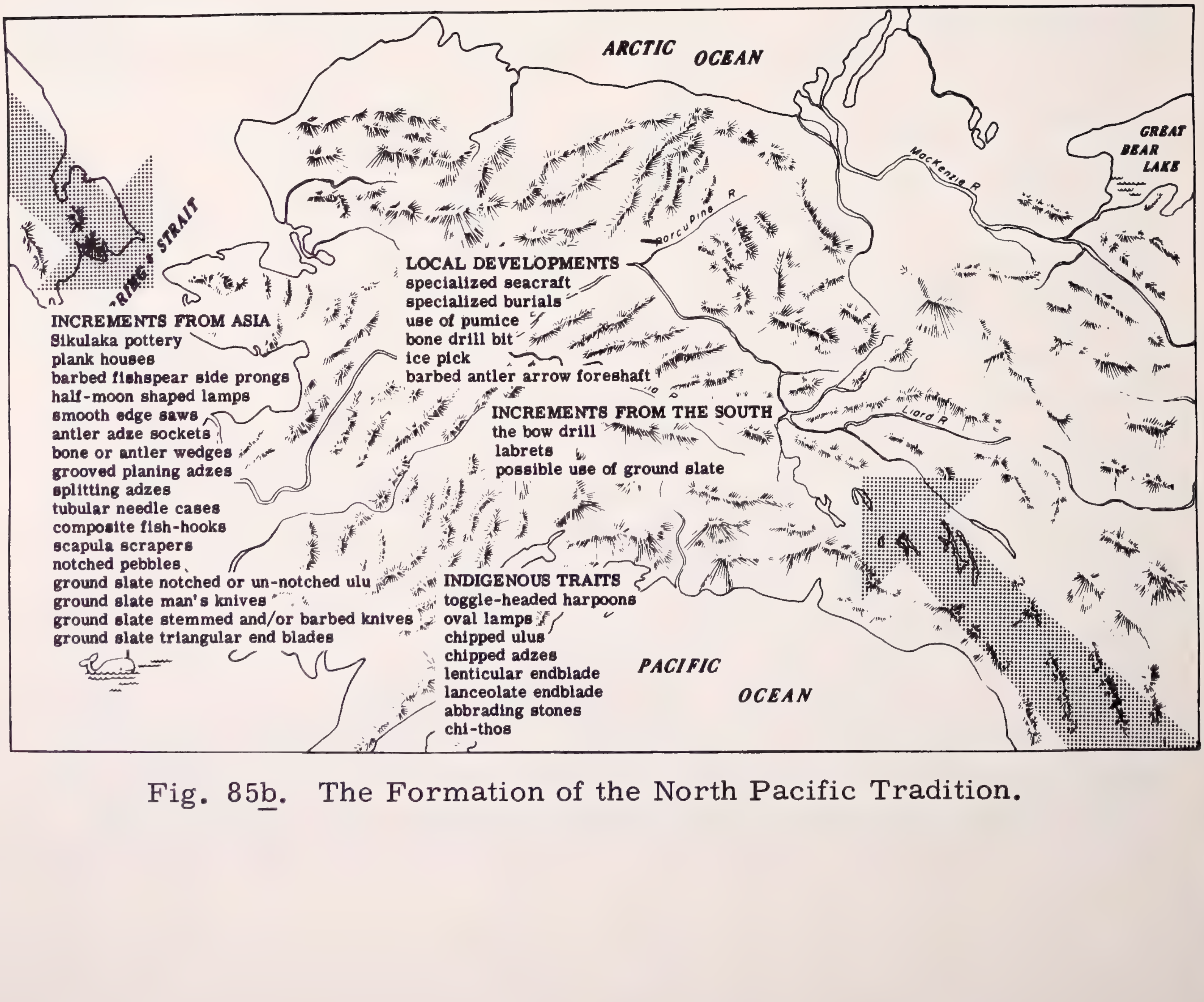


Fig. 85b. The Formation of the North Pacific Tradition.

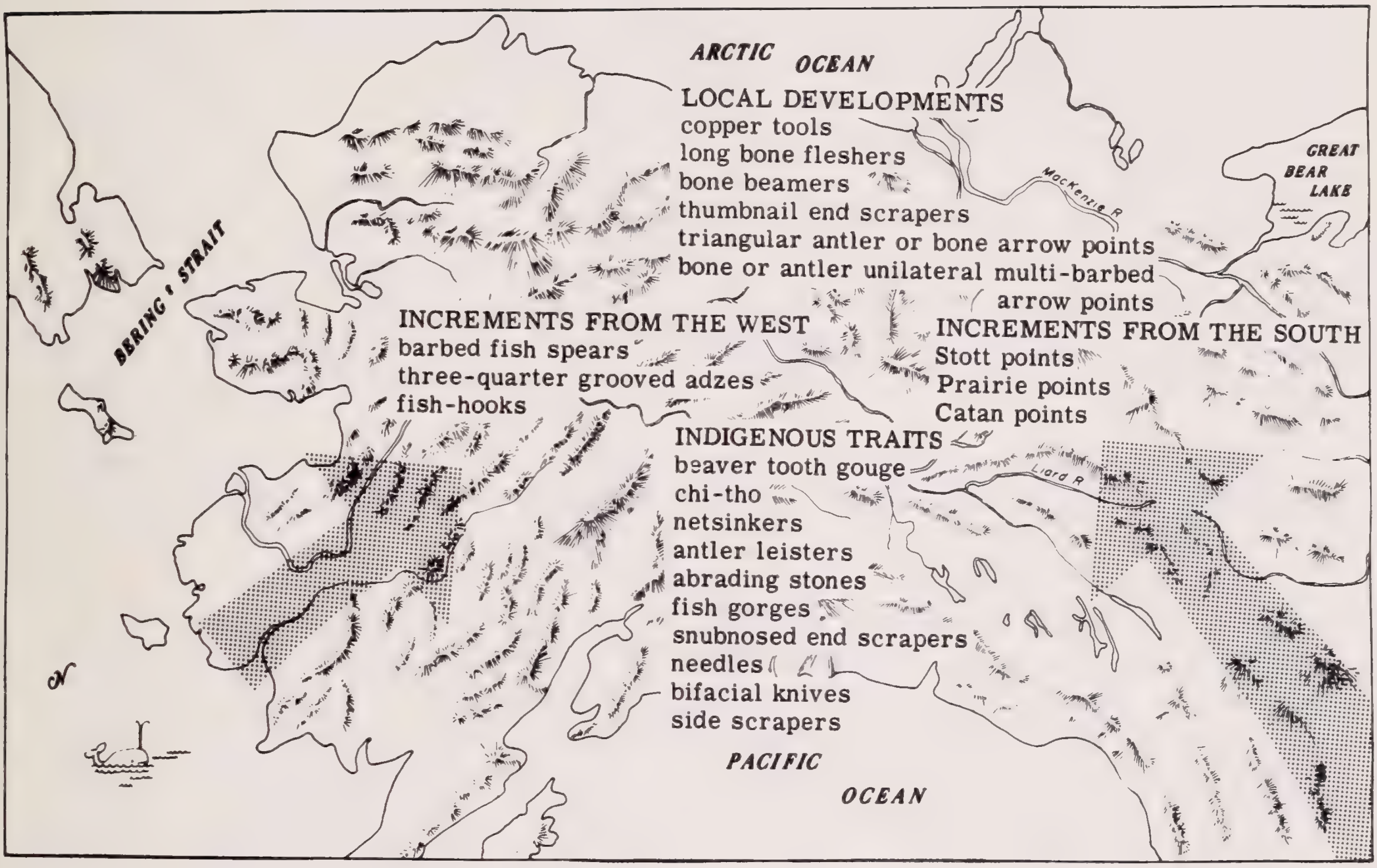


Fig. 86. The Formation of the Denetasiro Tradition.

on Inuk or North Pacific similar tools, or vice versa. Triangular ground antler arrow points and thumbnail end scrapers were other Denetasiro traits based on older concepts. Bone beamers, long bone fleshers, birch bark containers, and other bone tools were probably Denetasiro inventions. It would appear that the Denetasiro Tradition was in some way well adapted to the northwest boreal forest and that somehow it gradually replaced the Northwest Microblade Tradition which had previously occupied that region.

To terminate my speculations about the peopling of the New World's Northwest, I should like to generalize one step further. From the above information, it seems that a series of American traditions developed in the northwest and then spread over large areas and into particular ecological zones of North America. Comparisons between northern Old and New World traits have revealed that similar traditions do not appear to exist in the Old World, even though certain elements of each of the New World traditions were derived from Asia.

Further, it would appear that there has been a steady flow of people and ideas, back and forth across Bering Strait, due to the movements of the rich food resources in that area, and due to the fact that the Strait has never been a major barrier to either animal or man. In fact, to quote the one anthropologist who has lived there, Bering Strait is "a highway uniting kindred on one side with kindred on the other" (Jenness 1962: 63).

Hence from all this data, we may tentatively propose the following hypothesis, which describes the cultural process of the peopling of the New World.

As far as the Bering Strait region is concerned, the ideas and peoples who moved into it needed to change but little, except to make local adaptations to the culture or cultures already there. We except, of course, the first migrants! However, once ideas or peoples moved from the Bering Strait region to any of the many closely contiguous ecological zones, changes had to take place if they were to survive. To survive in their new environments, certain of the cultural activities already present might have been maintained because they were adaptable, others might have been gradully discarded in favor of newly received concepts, others might have been readapted to local conditions, and a few original adaptive inventions might have been made. This process ultimately would develop a new cultural tradition, or adaptive cultural complex, which would adjust itself to its particular environmental zone. Then, this newly integrated complex would commence to spread relatively rapidly through the whole of that zone. I suspect that during this spread, there would have been not only a movement of people with the complex, but as well, a diffusion of the new complex to people already there, who perhaps had a less effective adaptive complex -- as well as a combination of both processes.

It is to be expected, of course, that as the various traditions were spreading, there would have been some cultural changes taking place

within them. These might have occurred because of invention, cultural drift, adapting traits from peoples within the zone, or by the diffusion of ideas into or through the zone. Generally speaking, however, each tradition would maintain itself as an entity, until it was either replaced by another tradition developing in a similar way and adapted to the same environment, or until the environment itself changed and so forced the tradition to concurrent change.

APPENDICES

APPENDIX I

Description of Artifacts

This study is based on 305 whole or fragmentary projectile points from 64 components in the southwest Yukon. Of these, 178 specimens from the National Museum of Canada's collection and 18 from the Peabody Foundation of Archaeology of Andover, Massachusetts are complete enough to be classified. Of these, 122 National Museum and six Peabody Foundation classifiable specimens came from 26 excavated components.

The purpose of establishing types, the definition of a type, the method of establishing types and the terminology for projectile points used in this section has been previously discussed (MacNeish 1958b).

In this monograph the points are classified into 19 projectile point types. I believe that in preliminary investigation in a new area one must be a "splitter" rather than a "lumper," particularly when no classification has been undertaken in contiguous areas. I also believe that when more sequences are established and the modes of various types are shown to be the same in time and space, then many types will be "lumped" together. Unfortunately, putting these beliefs into practice results in a prodigious number of types which are not strongly differentiated one from the other. Because of this and a suspicion that the spacial significance of the types will eventually confirm my classification, I am going to be a bit premature and commence "lumping" some of the less well differentiated types.

Eleven of my Yukon types have the same attribute clusters and similar temporal significance as do ones which have been established further south in the continent. These are Lerma, Agate Basin, Milnesand, Plainview, Morhiss, Refugio, Anderson, Besant, Catan, Prairie, and Fresno. Since these are relationship types, not morphological types, and since the spacial significance or distribution does not connect with the Yukon, perhaps all should be at least suffixed with "-like." Even this I shall not do in the hope that my downright recklessness will stimulate others to make the necessary area studies and also, to commence compiling monographs on projectile point taxonomy which are continent-wide in scope.

In addition to chipped stone projectile points I have included bone, antler and copper ones in this section. The reason for this is that they have particular significance in the latest levels.

The general trends of the projectile point sequences are very similar to those found to the south in North America. Large unnotched points precede large notched and stemmed ones, and these in turn are followed by small arrow points. Unlike some of the other artifact types from this region, there seems to be little resemblance to trends in Asiatic or Arctic projectile point sequences. One cannot help wondering if these south-

Table 12

Distribution of Projectile Points in Excavated Components

Phase	Excavated component	Layer or level	TOTALS	Tip or body fragments of spears or darts	Lerma point	Rib bone spear point	Pelly point	Agate Basin point	Milnesand point	Minto point	Plainview point	Unibarbed bilateral antler point	Morhiss point	Refugio point	Anderson point	Besant point	Destruction point	Lockhart point	Taye point	Whitehorse point	Aishihik point	Plain antler point	Stott point	Catan point	Unilateral multibarbed antler point	Copper point	Leister	Triangular antler point	Arrow fragment	Prairie side-notched	Fresno point	Bilateral multibarbed iron point
Bennett	JbUq-1	Zone A	2																					1						1		
	JfVb-4	Level 1	4																				1	2							1	
	JiVs-1	Level 1-2	14	1																		1 ?	2	1	1	1	2	1	3	1		
	JhVf-4	Zone A	9	5																			2	1	1							
Aishihik	JiVs-3	Zone B	4	3											?						1											
	JhVq-1	Zone C	1																			1										
	JhVf-5	Level 2	2	1																	1											
	JfVg-1	Level 1-3	2	1																									1			
Taye Lake	JiVs-5	Zone E	3					1							1	1																
	JiVs-1	Level 3	3	1																2												
	JfVb-4	Level 2-3	19	5				1					2	4	1		1	2	1	2												
	IeSh-1	Level 2	14	9										2		1		1		1												
	KfVd-2	Floor 1	3					2						1																		
	JfVg-1	Level 4-11	12	3				1	1				1	3	2					1												
Gladstone	JgVp-1	Zone F	1																1													
	KfVd-2	Floor 2	2	1														1														
	JhVq-1	Zone F3	31	16				2					6	1	1	3	1	1														
	JiVs-1	Level 4	10	3				1				1	2	1	1	1																
Little Arm	LaVk-2	Zone B	15	10				1	2		2																					
	KkVa-2	Zone B	5	2				1	1	1																						
	JiVs-2	Zone F2	3	1				1	1																							
	JiVs-1	Level 5	6	1				4	1																							
	KfVd-2	Floor 3	3	1				2																								
Champagne	KfVe-1	Level 2	3	1				2																								
	KfVd-2	Floor 4	10	2			2	6																								
	KfVd-2	Floor 5	19	6		1	3	9																								
Kluane	JhVq-1	Zone G	3	1	2																											
	TOTALS		203	74	2	1	5	34	6	1	2	1	11	12	6	6	2	5	2	6	2	2	5	5	2	1	2	1	4	2	1	

Table 13

Distribution of Projectile Points in Surface Components

Phase	Surface Component	Layer or Level	TOTALS	Tip or body fragments of spears or darts	Lerma point	Rib bone spear point	Pelly point	Agate Basin point	Milnesand point	Minto point	Plainview point	Unibarbed bilateral antler point	Morhiss point	Refugio point	Anderson point	Besant point	Destruction point	Lockhart point	Taye point	Whitehorse point	Aishihik point	Plain antler point	Stott point	Catan point	Unilateral multibarbed antler point	Copper point	Leister	Triangular antler point	Arrow fragment	Prairie side-notched	Fresno point	Bilateral multibarbed iron point
Bennett	JbUq-5		1		....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
	JbUq-2		3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....
	JhVf-9		2		....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Aishihik	KeVd-2		8	3	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	3	....	....	....	....
	JjVi-3		2		....	....	....	....	....	....	....	....	....	....	1	1?	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JbUr-1		1		....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JaUe-1		2		....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Taye Lake	JcVe-1		3	2	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	KkVa-1		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JfVb-5		1		....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	HjRr-1		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JfVb-7		1		....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JeVc-2		8	5	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
	JeVc-4		6	1	....	....	....	....	1	....	1	....	2	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Gladstone	JjVj-5		1		....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JjVi-5		1		....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JjVj-3		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JfVg-3		6	2	....	....	....	1	1	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JeVc-1		6	4	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Arm	JjJj-2		2		....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JeVc-5		4	1	....	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JjVi-2		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JeVi-1		5	3	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	KjTx-1		1		....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champagne	KjTx-3		1		....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JfVg-2		1		....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JgVd-1		1		....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JbUq-6		1		....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JeVc-3		8	4	....	....	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JiVc-4		2		....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JhVf-6		1		....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JfVc-2		2		....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JjVj-4		1		....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JbUq-4		1		....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Others	JgVp-1		5	1	....	....	....	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JaUu-1		1		....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JdUp-1		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	JjVj-6		1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	Other specimens		8	2	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	1	....	1
	TOTALS		103	35	1		1	17	13		4		3	1	5	6		2		3			2	1	1	1			3	3		1

ern Yukon trends are northern reflections of developments which took place further south in North America. Only in the triangular arrow points, antler and bone points in late horizons and in the leaf-shaped (Lerma) points in the earliest complex do we find parallels between the New World Arctic and Siberia. The use of copper points in the latest Yukon horizon is a somewhat unique trait. I do not believe it is connected with the development of copper working techniques in other parts of North America.

Projectile Points
(Tables 12 and 13)

Lerma Points
Fig. 87, no. 26, 27. Sample. 3 Specimens

Form and Chipping Technique. Two small basal portions of basalt points occurred in Zone G of the Gladstone site (JhVq-1). They are relatively thick and have pointed bases with basal grinding. They appear to be the same type as the complete point Johnson (F. Johnson 1946) found on the surface of the Little Arm site (JeVi-1) and one was found on top of a mountain north of Ptarmigan Heart (Fig. 42, no. 8). Lerma points are lenticular in outline, being pointed at both ends, and they are relatively thick. The fragments were made from rather thick obsidian flakes retouched along their edges. Part of one basal portion is very slightly ground.

Dimensions. Length, 72 mm.; width, 13 mm.; thickness, 7 mm. or more.

Geographical and Temporal Relationships. These have a wide distribution in western North America and perhaps South America. They are found for the most part on an early time horizon (8000-5000 B.C.). They occur in the Flint Creek horizon in the northern Yukon (MacNeish 1959a: 47; Plate II, No. 1), in the second and third horizons at the Frazer Canyon site in British Columbia (Borden 1960, Plate IV, Fig. 3; MacNeish 1960: 199), in the early levels of the Lind Coulee site in Washington (Daugherty 1956, Fig. 18, Nos. 8, 9, and 12), and in the Five Mile Rapids site in Oregon (Cressman 1960), the San Dieguito culture of California (Rogers 1939), sites in Tamaulipas (MacNeish 1958) and the Iztapan (Aveleyra 1956), sites in the valley of Mexico, in the Ajuereado complex of Puebla (MacNeish 1961), the El Jobo site in Venezuela (Cruxent and Rouse 1956) and an early site near Quito, Ecuador (Mayer-Oakes, personal communication). Similar points occur in the more easterly parts of the United States on either the same time level or in more recent times (Suhm and Krieger 1954). They may be related to the dominant point type in the Kayuk (Campbell 1959), Acasta Lake, N. W. T. (Forbis 1961), and the Klondike (MacNeish 1959a) complexes in the north. They, also, may be related to points in Paleolithic sites in Siberia (Okladnikov 1961).

Rib Bone Points
Fig. 87, No. 31. Sample. 1 Specimen

Form and Chipping Technique. This point has been made from a rib of a large animal(buffalo ?). It has a long gradual tapering tip and straight edges on the body having been ground to its desired form. It is diamond-shaped in cross-section. The tapering body is marked off from the straight stem by a slight convex protuberance on its lateral edges which is the widest part of the point. The stem is convex-convex in cross-section and has convex edges. It has a straight base. The body is about five times as long as its stem.

Dimensions. Length, 86 mm.; length of stem, 17 mm.; width of stem, 14 mm.; maximum width, 15 mm.; maximum thickness, 4.5 mm.

Geographical and Temporal Relationships. This point occurred with the Champagne complex in Floor 4 at the Pelly Farm site (KfVd-2). I know of no other point similar to it.

Pelly Points
Fig. 87, Nos. 23 to 25. Sample. 6 Specimens

Form and Chipping Techniques. These are stubby points with short, abrupt tips, widely convex edges. The part converging towards the tip is equal to or slightly shorter than the part converging towards the base. Four of the narrow bases are slightly concave. The other two are slightly convex. All lateral basal edges show some evidence of grinding. The chipping technique is mainly by pressure flaking and the flakes are often crudely collateral making the points lenticular in cross-section.

Dimensions. Length, 23-36 mm., average 31 mm.; maximum width, 15-26 mm., average 18 mm.; basal width, 8-15 mm., average 10 mm.; thickness, 5-7.5 mm., average 5.6 mm.

Geographical and Temporal Relationships. Originally I thought these points to be variants of Agate Basin points, tips of which had been broken and reworked. However, the presence of all of them only in Champagne sites, unlike Agate Basin points, justifies setting them up as a separate type. I know of no similar points. The Mohave Lake points (Wormington 1957: 270) and some from Five Mile Rapids, Oregon (Cressman 1960) are nearest counterparts but the resemblance is not great.

Agate Basin Points
Fig. 87, Nos. 28 to 30, 32. Sample: 51 specimens

Form and Chipping Technique. These are long, narrow, and lanceolate in outline with slightly convex lateral edges. Most of them have their maximum width about a quarter of the way up from their very narrow

Fig. 87. Projectile Points. Scale about one-half natural size.

1. Anderson Point (KeVd-2)
2. Anderson Point (JfVb-4/13-3f)
3. Anderson Point (JiVs-5)
4. Besant Point (JeVc-2)
5. Besant Point (JjVi-3)
6. Besant Point (JiVs-1/52-4d)
7. Lockhart Point (JfVb-5)
8. Lockhart Point (JeVc-2)
9. Lockhart Point (KfVd-2/11-2a)
10. Unibarbed bilateral antler point (SiVs-1/22-5b)
11. Refugio point (JfVb-4/8-3e)
12. Refugio point (JfVg-1/10-6a)
13. Minto point (KkVa-2)
14. Whitehorse point (XI-B-88-JiVs-1)
15. Whitehorse point (JiVs-1/14-3b)
16. Whitehorse point (XI-B-46-JeVc-2)
17. Plainview point (KjTx-3)
18. Plainview point (JhVf-9)
19. Plainview point (JjVj-2)
20. Milnesand point (XI-B-2)
21. Milnesand point (JiVs-1)
22. Milnesand point (JfVg-2)
23. Pelly point (KfVd-2/4-5e)
24. Pelly point (KfVd-2/1)
25. Pelly point (JfVb-2)
26. Lerma point (JhVq-1-SG3-4)
27. Lerma point (KfVd-2)
28. Agate Basin point (JjVj-4)
29. Agate Basin point (JiVs-1/34-5a)
30. Agate Basin point (KfVd-2/2-5)
31. Rib bone point (KfVd-2/15-5e)
32. Aberrant Agate Basin point (KfVd-2)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bases. These may be variants of the main type but when more specimens are found and their significance determined they may be another type. For the moment, however, we are leaving them in the Agate Basin category. Eight have slight convex bases, the rest are almost straight, or slightly concave. The flaking on their surfaces is usually by pressure and is roughly collateral, though three have oblique ripple flaking. Edges have been pressure flaked and though the bases of all have been slightly thinned, only eight have noticeable flake scars from the basal thinning. The lateral edges above the base are always well ground, and about half the specimens have the ground bases.

Dimensions. Length, 72-134 mm., average 84 mm.; width, 15-30 mm., average 23 mm.; thickness, 4-18 mm., average 9 mm.

Geographical and Temporal Relationships. These appear in the Champagne and Little Arm complexes in southwestern Yukon, and four occur at Gladstone complex sites. In the north, similar points occurred in the Great Bear River complex at the west end of Great Bear Lake (MacNeish 1955), and in the Artillery Lake complex in the barren lands east of Great Slave Lake (MacNeish 1951, Pl. VIII; Harp 1959). One was also found at Sandy Lake near Fort Liard (MacNeish 1954, Fig. 68, C-2 and 3). These are almost duplicates of a point type common in Alberta and which appears over much of the western United States (Wormington 1957: 141). Interestingly enough similar points have recently been found associated with burins, microblades, and tongue-shaped polyhedral cores in Japan (Yoshizaki 1959, Fig. 19, No. 13).

In the north these points have been dated as being present about 6000 to 3000 B.C. (MacNeish 1956). In the Great Plains to the south they have been dated between 5000 and 7000 B.C. (Wormington 1957). This illustrates the fact that the type has spread northward.

Milnesand Points

Fig. 87, Nos. 20 to 22. Sample: 19 specimens

Form and Chipping Technique. These are roughly lanceolate in outline with parallel convex lateral edges and a straight to slightly convex base. The chipping of the surfaces varies somewhat. Most of them have parallel pressure ripple flaking, either horizontally or slightly oblique, on their surfaces. Six have very slight collateral flaking. Eight have a few flakes removed, thinning their basal portion. All edges have small amounts of fine pressure flaking, and most basal portions of the lateral edges have grinding on them. Ten also have grinding on their basal edges. In two cases the grinding is so pronounced along the lateral edges that they have the general appearance of having a wide straight stem like Scottsbluff points, but I believe these to be variants of this same type.

Dimensions. Length, 41-82 mm., average 65 mm.; maximum width, usually near the midpoint, 20-28 mm., average 24 mm.; maximum thickness, 4-8.5 mm., average 6 mm.

Geographical and Temporal Relationships. These points appeared in

excavations mainly in Little Arm components though one was found in the lower levels of a Gladstone site. They have appeared on the surface of Champagne, Little Arm, and Gladstone sites. Similar points occur in Alaska (Gidding 1962; Skarland and Giddings 1948, Pl. XV-B, C, D, p. 119; Skarland and Keim 1958: 83) and have been found with the Great Bear River complex on the west end of Great Bear Lake (MacNeish 1955, Pl. VI, No. 2). Wormington has indicated that they are very common and widely distributed from Alberta to as far south as the Valley of Mexico (Wormington 1957: 11-112). They, like Agate Basin points, may be a little earlier in the south.

Minto Points

Fig. 87, No. 13. Sample: 1 specimen

Form, Chipping Technique, and Dimensions. This is a short (24 mm.), wide, (17 mm.) triangular point with slightly convex edges. It has a slightly concave base which is asymmetrical, that is, one junction of the lateral edge and base is a right angle and the other junction of edge and base forms a noticeable tang. The point is made from a thin (3 mm.) flat flake and has fine pressure flaking along its edges.

Geographical and Temporal Relationships. At first glance this point looks like late types which are widespread all over North America. Therefore it would obviously be intrusive into the Little Arm materials in which it was found. I personally dug up this point well down in the reddish soil under and associated with microblades as well as other typical Little Arm tools. Furthermore, no other late tool type was found at this site. Therefore, I doubt that it is late and intrusive. A second explanation is that this is an aberrant point or as one of my friends is in the habit of saying, "made by the village idiot." This is a possibility. However, it can be pointed out that this is not similar to most late triangular points in North America because it has an asymmetrical basal tang and is very similar in shape to points in the late "Paleolithic" and preceramic "Neolithic" of Siberia. Is it related?

Plainview Points

Fig. 87, Nos. 17 to 19. Sample: 6 specimens

Form and Chipping Technique. These are basal fragments or points with roughly parallel, slightly convex lateral edges and concave bases. Irregular collateral pressure flaking appears on the surfaces. The edges are retouched. Basal edges and basal portions of the lateral edges have been ground on a few of them.

Dimensions. Estimated maximum length, 70 mm.; maximum thickness, 4-10 mm., average 6.3 mm.; basal width, 19-29 mm., average 24 mm.

Geographical and Temporal Relationships. The only two found in excavation were found at a Little Arm complex site, Moosehide (LaVk-2). Specimens were found on the surface at a Bennett Lake site, a Taye Lake site, a Little Arm site, and a Champagne site. Similar points were found in the Franklin Tanks site on the west end of Great Bear Lake (MacNeish 1955: 60), at least one was found on the Firth River in northern Yukon (MacNeish 1956a: 96), and one appeared in a collection from Alaska (Rainey 1940). As Krieger has shown (Krieger 1947; Suhm and Krieger 1954: 472), these points, or ones similar to them are distributed from Alaska to northern Mexico.

In the south they appear in the general time period from about 4000 to 8000 B.C. Though we lack dates on Plainview sites in the north, there is the suspicion that the oldest ones are those found south of the Yukon River.

Unibarbed Bilateral Antler Points

Fig. 87, No. 10. Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. This small barbed fragment of a projectile point tip or fish spear tip was ground from antler. The tip is abrupt and the edges intersecting at it are slightly convex. Below the body are two short (2 mm.) barbs on either side which lead to a diamond-shaped stem. The widest part of the point (12 mm.) is just slightly wider than the body at the barbs. The point is lenticular in cross-section having a maximum thickness of 6 mm. at the stem. The body tapers toward the tip. The base is broken off, but the point was at least 42 mm. long, the stem and tip now being about equal in length.

Geographical and Temporal Relationships. This was found in a Gladstone deposit and resembles few other points in the north. It looks vaguely like some in the Choris (Giddings 1957) and the Joe Creek complexes (MacNeish 1956a, Pl. VI) on the Arctic coast.

Morhiss Points

Fig. 88, Nos. 7, 9, 15. Sample: 14 specimens

Form and Chipping Technique. The five most complete specimens have a roughly triangular body about three times as long as the contracting stem. Body edges of all specimens are convex, and the shoulder, which blends into a contracting stem with a slightly flattened base, is ill-defined. The edges have fine pressure retouching on them, and the surfaces are relatively poorly smoothed by percussion flaking. The lateral edges on five of the stems show grinding.

Dimensions. Length, 35 to more than 60 mm.; maximum width at shoulder, 14-32 mm., average 26 mm.; maximum thickness, 4-14 mm., average 6 mm.

Geographical and Temporal Relationships. In the southwest Yukon these points appear in the Gladstone and Taye Lake complexes. In the north, they occur at the Pointed Mountain site at Fort Liard (MacNeish 1954: 244), at the Campus site (Rainey 1939), and on the Tyone River (Irving 1957: 43). In the United States they are common in Archaic time period complexes (Bell 1958: 59) and they occur in Mexico apparently slightly later (MacNeish 1958).

Refugio Points

Fig. 87, Nos. 11 and 12. Sample: 13 specimens

Form and Chipping Technique. These points are roughly teardrop-shaped in outline. They have convex edges, a convex base, and an abrupt tip. The surfaces bear percussion flake scars and edge pressure flake scars. One point has some lateral grinding on its edges near the base.

Dimensions. Length, 50-76 mm., average 64 mm.; width, 24-35 mm., average 29 mm.; thickness, 6-14 mm., average about 8 mm.

Geographical and Temporal Relationships. In the southwest Yukon they are found only in the Gladstone and Taye Lake phases but elsewhere in North America they are common, having been made during a long period (Suhm and Krieger 1954).

Anderson Points

Fig. 87, Nos. 1 to 3. Sample: 11 specimens

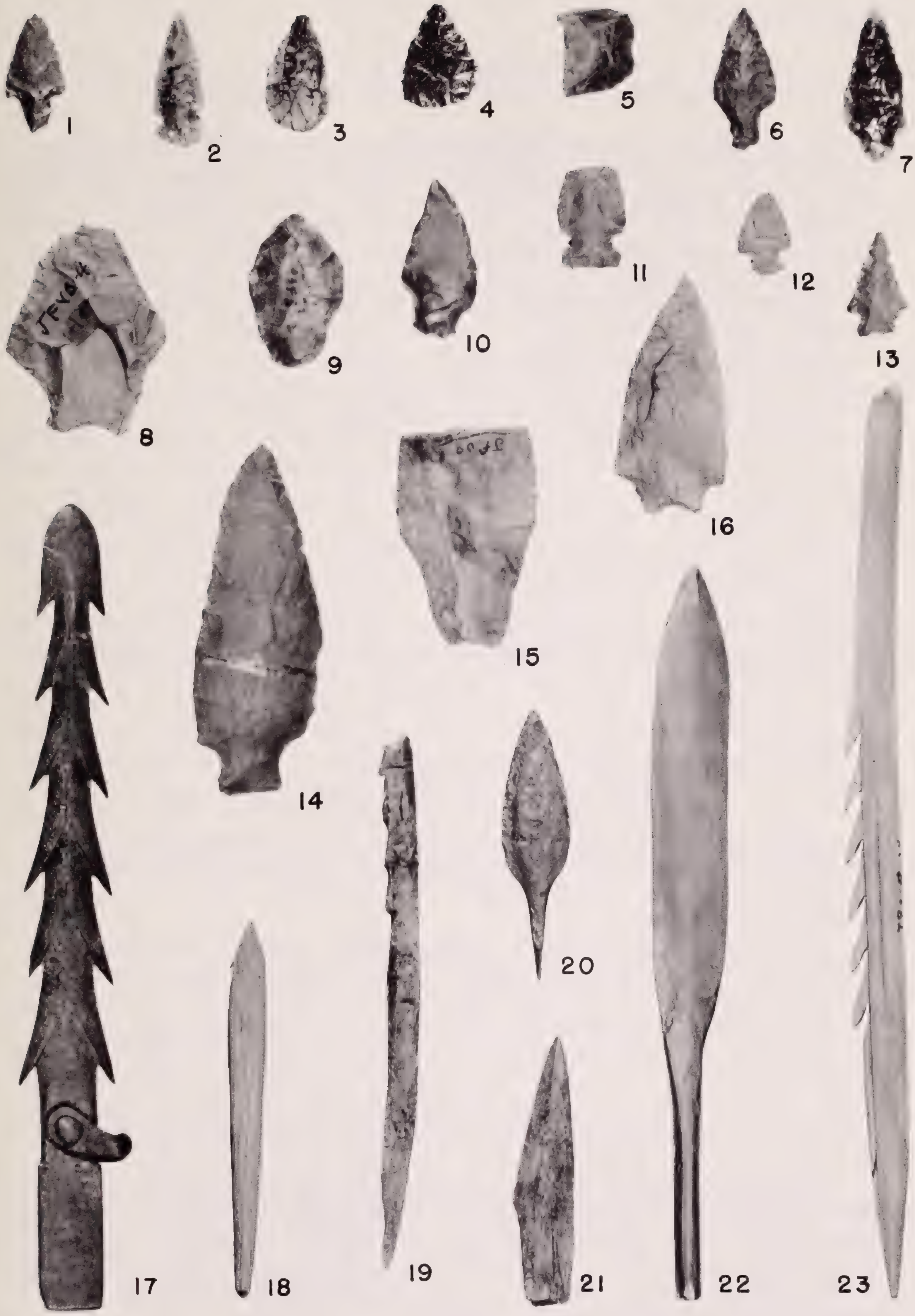
Form and Chipping Technique. These points are corner notched with straight to slightly convex bases. They are relatively long in proportion to their width. The surfaces are trimmed by rough collateral flaking, and the edges are pressure retouched. The corners are widely diagonally notched, and only two of the specimens have a fairly sharply-defined corner tang.

Dimensions. Length, 44-58 mm., average 50.6 mm.; width, 22-32 mm., average 25.5 mm.; thickness, 6-9 mm., average 7 mm.

Geographical and temporal relationships. These points range in time from Gladstone through the Aishihik Complex in the southwest Yukon. A few also have been found in the Lockhart River complex of the Northwest Territories (MacNeish 1951), and one was found in the Natalkuz Lake complex from Tweedsmuir Park in north-central British Columbia (Borden 1952, Pl. II, No. 15). Farther south in the Canadian Plains and Prairies they appear in late Archaic times and in Manitoba they continued in use until the Middle Woodland Period. Similar ones occur at about this same time in the United States.

Fig. 88. Projectile Points. Scale about one-half natural size.

1. Aberrant Stott point (LaVk-2)
2. Prairie point (JbUq-2)
3. Catan point (JbUq-1)
4. Catan point (JfVb-4/4-1)
5. Destruction Bay point (JhVq-2)
6. Stott point (JiVs-1/14-2)
7. Morhiss point (JeVc-2)
8. Taye point (JfVb-4/1-3e)
9. Morhiss point (JhVq-1/4F3-2)
10. Fresno point (JiVs-2)
11. Prairie point (JbUq-1)
12. Stott point (JfVb-4)
13. Stott point (JhVf-9)
14. Aishihik point (JhVf-5)
15. Morhiss point (JfVq-1/1-6a)
16. Taye point (JgVp-1)
17. Iron Point (XI-B-263)
18. Plain antler arrow point (JhVq-1/9e-1)
19. Antler leister (JiVs-1/37-2a)
20. Native copper point (JiVs-1)
21. Triangular antler point (JiVs-1/49-2b)
22. Copper spear (modern brass) (XI-B-269)
23. Unilateral multibarbed antler arrow point (XI-B-282)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Besant Points
Fig. 87, Nos. 4 to 6. Sample: 12 specimens

Form and Chipping Technique. These points are all relatively long and wide with concave bases and wide, shallow side notches just about the base. The chipping on the surfaces is by pressure flaking and is roughly collateral. The edges, and particularly the base, have finer pressure retouching. The side notches are relatively wide (7 mm.) but not very deep (2 mm.). Two points exhibit evidence of lateral grinding near the side notches and one has basal grinding. There are only two complete points.

Dimensions. Length, 27-53 mm., average 45.7 mm.; width, 18-32 mm., average 23.7 mm.; thickness, 5-8 mm., average about 6 mm.

Geographical and Temporal Relationships. These are found in sites of the Gladstone, Taye Lake, and Aishihik complexes. They are also found in the Lockhart River (MacNeish 1951) complex and the Fisherman's Lake complex (MacNeish 1954), in the Northwest Territories, and two very similar ones were found at the Tyone River site (Irving 1957) in central Alaska. In the Brooks Range they are associated with the Tuktu complex (Campbell 1961a) and at Bering Strait with the Palisades complex (Giddings 1962). These begin to appear in the late microblade sites in the Northwest and to last after this tradition has died out. Further south in the Canadian Plains and Prairies they appear in late preceramic times (Wettlaufer 1956).

Destruction Bay Points
Fig. 88, No. 5. Sample: 2 specimens

Form, Chipping Technique, and Dimensions. Each of these small fragments are parallel sided stems (about 15 mm. long) with straight bases (about 18 mm. wide) which have ground edges. They have pressure flaking on their surfaces.

Geographical and Temporal Relationships. One occurred at the Gladstone site and one at the Taye Lake site. Wide comparisons of this poorly defined type or trial type must await the finding of a more adequate sample of complete specimens in the Yukon.

Lockhart River Points
Fig. 87, No. 7 to 9. Sample: specimens

Form and Chipping Technique. These are relatively long, narrow points with straight to convex edges and a straight to convex base. They have side notches just above the base. These side notches are fairly deep and relatively wide. Most have some grinding on either the base or in the notches or both. Edges are retouched by pressure flaking, and surfaces have rough percussion flaking.

Dimensions. Length, 34 and 63 mm. (two complete specimens); maximum width, 21-31 mm., average 25 mm.; maximum thickness, 6-9 mm., average 8 mm.

Geographical and Temporal Relationships. These begin in the Gladstone complex and are common in Taye Lake. In the north they have widespread relationships. They are present in the Lockhart River complex (MacNeish 1951, Pl. III), in the N. T. Docks complex at the west end of Great Bear Lake (MacNeish 1955b, Pl. V, Fig. 1), at Pointed Mountain near Fort Liard (MacNeish 1954: 246), in the Brooks Range in the Tuktu complex (Campbell 1961b), on the Campus sites in central Alaska (Rainey 1939), on the Tyone River (Irving 1957: 43), and in the Palisades site in western Alaska (Giddings 1962). In almost all cases these points are associated with microblades or prismatic blades and apparently were present during the last part of that tradition. I have seen similar points from the Plains and Prairies of Canada, but as yet these have not been illustrated in archaeological publications.

Taye Points

Fig. 88, Nos. 8 and 16. Sample: 2 specimens

Form, Chipping Technique, and Dimensions. These points are relatively long (54 mm.), narrow (25 mm. and 37 mm.), and thin (6 and 7 mm.). The tips are gradual, the edges of the body slightly convex, and the body 4 to 5 times as long as the stems. The shoulders are not well defined and blend into contracting stems with concave or notched bases. Both are made from long thin flakes having percussion flaking on only one surface though both surfaces bear pressure flaking along their edges. More specimens are needed to define this "trial type."

Geographical and Temporal Relationships. One occurred at Taye Lake, the other was in a very late Gladstone site.

Whitehorse Points

Fig. 87, Nos. 14 to 16. Sample: 9 specimens

Form and Chipping Technique. These are short, wide lanceolate points having convex lateral edges and concave bases. They were made from flat flakes and bear a few percussion flake scars in their surfaces. The edges are neatly retouched.

Dimensions. Length, 31-52 mm., average 38 mm.; width, 18-30 mm., average 22 mm.; thickness, 4-9 mm., average 6 mm.

Geographical and Temporal Relationships. All these points occur in components of the Taye Lake horizon. Some of the more neatly made examples are similar to those in Arctic Small Tool horizons (Giddings 1951).

Aishihik Points
Fig. 88, No. 14. Sample: 2 specimens

Form, Chipping Technique, and Dimensions. Only one point is complete enough to describe. This is long (28 mm.), narrow (27 mm.), and thick (8 mm.). It is corner notched, has a short (9 mm.), slightly flaring stem and a concave base.

Geographical and Temporal Relationships. Both these points were found in the Aishihik complex. Our sample is too limited to permit wider comparisons.

Plain Antler Arrow Points
Fig. 88, No. 18. Sample: 1 complete specimen and 1 possible small fragment

Form, Manufacturing Technique, and Dimensions. These points were ground out of cut antler. The more complete one is 85 mm. long and has a maximum width of 7 mm. located about 10 mm. back from its abrupt point. The thickness is about 5 mm. The body, from its widest portion near its tip, tapers to a pointed base which is round in cross section.

Geographical and Temporal Relationships. These points appeared at an Aishihik and a Bennett Lake site. They bear a vague resemblance to some Eskomo arrow point blanks (Ford 1959:125i).

Stott Points
Fig. 88, Nos. 1, 6, 12, 13. Sample: 7 specimens

Form and Chipping Technique. These points are small and wide in proportion to their length having either concave or convex bases and diagonal notching at their corners. Most of them are made from thin flakes which have been roughed into shape, mainly by pressure retouching along their edges. Two have no noticeable corner tang.

Dimensions. Length, 18-32 mm., average 25 mm.; width, 13-27 mm., average 16 mm.; thickness, 3-5 mm., average 4 mm.

Geographical and Temporal Relationships. These were found only in the Bennett Lake complex of the southwest Yukon. However, they are widespread in the late historic and prehistoric villages in the entire northwestern interior and in much of the Plains area of Canada (MacNeish 1955a, Pl. 5, No. 5).

Catan Points

Fig. 88, Nos. 3 and 4. Sample: 6 specimens

Form and Chipping Technique. These are small points, teardrop-shaped in outline and with convex lateral edges and convex base. The surface bears irregular percussion flaking and the edges are retouched. The bases are usually thinned.

Dimensions. Length, 23-40 mm., average 28 mm.; width, 13-29 mm., average 19 mm.; thickness, 4-7 mm., average 5 mm.

Geographical and Temporal Relationships. These points appear in the Bennett Lake complex although one was found at an Aishihik site, in the Yukon. The type is widespread in North America in the latest prehistoric cultures (Suhm and Krieger 1954; MacNeish 1958).

Unilateral Multibarbed Antler Arrow Points

Fig. 88, No. 23. Sample: 3 specimens, 2 very incomplete

Form and Manufacturing Technique. This type of point is ground out of antler and is prismatic in cross-section. The base is concial in cross-section, and the tip is a very flat prism. On one of the prismatic edges, six V-shaped notches have been cut to form barbs. There are two parallel-incised lines on the sides adjacent to the barbed portion.

Dimensions. Length, more than 160 mm.; width, 10 mm.; thickness, 10 mm.

Geographical and Temporal Relationships. Points similar to these are found throughout Athabascan territory in late prehistoric and early historic times.

Copper Points

Fig. 88, Nos. 22 and 20. Sample: 2 specimens

Form, Manufacturing technique, and Dimensions. Both of these points have been beaten out of copper and then ground. One is very long (165 mm.) and the other is short (61 mm.). Both are about the same width (18 and 16 mm.). The body section is thin (2 mm.) and diamond-shape in cross-sections. The bodies are roughly teardrop-shaped. The larger one has a straight asymmetrical stem, the other is pointed.

Geographical and Temporal Relationships. These points have been found in the Bennett Lake complex in the Yukon and in a late site in Central Alaska (Rainey 1939).

Antler Leisters

Fig. 88, No. 19. Sample: 2 specimens

Form, Manufacturing Technique, and Dimensions. Initially a long (128 mm.), narrow (8 mm.), and thin (5 mm.) rectangular blank was cut from a piece of curved antler. Next, a thin, narrow tapering stem was ground on one end and the other was cut to a long gradual oblique point. Then four notches for barbs were cut out of the convex edge.

Geographical and Temporal Relationships. These were found in a Bennett Lake level and are similar to ones all across the Arctic and sub-Arctic in late prehistoric times.

Triangular Antler Point Fragment

Fig. 88, No. 21. Sample: specimen

Form, Manufacturing Technique, and Dimensions. This tip fragment has been ground out of antler. It has a long (61 mm.) tapering tip, is diamond-shaped in cross-section though thin (4.5 mm.) and has a maximum width of about 20 mm. Its basal section is missing.

Prairie Points

Fig. 88, Nos. 2 and 11. Sample: 5 specimens

Form and Chipping Technique. These are small isosceles triangular points having deep, narrow side notches just above their straight or slightly convex base. Most of them have fine pressure flaking collaterally on both surfaces.

Dimensions. Length, 30-35 mm., average 33 mm.; width, 12-17 mm., average 15 mm.; thickness, 3-4 mm.

Geographical and Temporal Relationships. These are found in the Bennett Lake complex in southwest Yukon and are found over much of the United States in late prehistoric and historic sites (MacNeish 1958a).

Fresno Points

Fig. 88, No. 10. Sample: 1 specimen

Form, Chipping Technique, and Dimensions. This small (33 mm.), narrow (15 mm.), thin (4 mm.) triangular point has slightly convex edges and base. It was made from a thin flake and is retouched along its edge on both surfaces.

Geographical and Temporal Relationships. This point was found under the Bennett complex in the Yukon and is related to similar ones over most of North America during the early historic or late prehistoric times (Suhm and Krieger 1954).

Bilateral Multibarbed Iron Points
Fig. 88, No. 17

This point is not described because it is of European manufacture.

Polyhedral Cores, Blades and Microblades

Forty-two polyhedral cores, 540 blades and 998 microblades were found in the Yukon investigations. Of these, 1393 blades or microblades and 34 cores came from excavations by the National Museum while eight blades and two cores are in the R. S. Peabody Foundation collections.

Before discussing the cultural and chronological aspects of these artifacts a few definitions are in order. First, the part of the core which bears evidence of having been prepared to receive blows is called either the base or striking platform. The opposite end is called the tip. The part of the core which has a series of adjacent parallel grooves separated by ridges extending away from the striking platform is called the fluted or polyhedral surface or edge. Wide sections or sides of the cores are referred to as surfaces while narrow sides or sections are called edges.

Blows or pressure exerted on the striking platform from just above its junction with the fluted surface (with lines of force running parallel to that surface) often result in blades or microblades being spalled off the cores. Blades and microblades have one relatively flat surface that formerly was connected to the core as well as a bulb of percussion on that surface resulting from the cleaving blow. The latter is called the ventral surface. The opposite side, which formerly was the core exterior, is called the dorsal surface.

The junction of the dorsal and ventral surface is called the blade or microblade edge. Blades or microblades with a single ridge on their dorsal surface paralleling their lateral edges are considered to be prismatic while ones with two or more ridges are called truncated. If the ridge or ridges are irregular and do not exactly parallel the edges they are considered crude blades (or microblades). Occasional random flakes are difficult to distinguish from crude blades. The narrow part of the blade or microblade adjacent to the bulb of percussion is the base and the opposite end the tip.

In plotting the frequency of the widths of blades and microblades from single components, the Little Arm site (JiVs-1) and the Taye Lake site (JfVb-4), we noticed that frequency of widths often had a bimodal distribution. One peak occurred at about 9 mm. and another at about 14 mm. This bimodality seemed to have temporal significance. Because of this we have separated all those under 10 mm. into one group which we are calling microblades and the wider ones are considered blades (Taylor 1962).

Since blades and microblades are the end result of making cores, we studied the polyhedral cores first. Almost as soon as the 36 polyhedral

Table 14

Distribution of Blades, Microblades and Cores in Excavated Components

Phase	Excavated Components	Layer or Level	BLADES										MICROBLADES													TOTAL	POLYHEDRAL CORES			TOTAL
			Thin Truncated			Thin Prismatic			Thick Prismatic				Thick Truncated			Thin Truncated			Thick Prismatic			Thin Prismatic								
			no retouch	1 edge retouch	2 edge retouch	no retouch	1 edge retouch	2 edge retouch	no retouch	1 edge retouch	2 edge retouch	others	no retouch	1 edge retouch	2 edge retouch	no retouch	1 edge retouch	2 edge retouch	no retouch	1 edge retouch	2 edge retouch	no retouch	1 edge retouch	2 edge retouch	crude microblades	blades and microblades	tongue-shaped	conical	tabular	polyhedral cores
Taye Lake	JiVs-5	Zone E	......	......	1	......	......	......	......	......	......	......	......	......	......	2	......	......	......	......	......	......	......	......	......	3	......	......	......	......
	JiVs-1	Level 3	4	1	......	4	......	......	1	......	......	1	......	......	......	2	......	......	1	......	......	1	......	......	3	18	......	......	2	2
	JfVb-4	Level 2-3	34	......	......	74	2	2	16	1	......	......	......	......	......	3	......	......	8	......	......	18	......	......	14	172	......	......	1	1
	IeSh-1	Level 2	23	2	......	28	6	2	6	2	2	1	......	......	......	......	......	......	2	......	......	4	......	1	5	84	1	1	1	3
	KfVd-2	Floor 1	10	1	......	13	......	......	6	......	......	......	......	......	......	2	......	......	2	......	......	5	......	......	7	46	......	1	1	2
	JfVg-1	Level 4-10	1	......	2	9	2	......	1	......	......	1	......	......	......	1	......	......	2	......	......	7	......	......	3	29	......	1	......	1
Gladstone	JgVp-1	Zone F	1	......	......	2	......	......	1	......	......	......	1	......	......	......	......	......	1	......	......	2	......	......	1	9	......	......	......	......
	KfVd-2	Floor 2	1	......	......	4	......	......	......	......	......	......	......	......	......	......	......	......	1	......	......	......	......	......	2	8	......	......	......	......
	JhVq-1	Zone F	10	4	......	16	2	......	1	......	......	......	8	......	......	9	......	......	7	......	......	15	......	......	30	102	1	3	3	7
	JiVs-1	Level 4	11	1	......	8	1	......	2	......	......	......	9	......	......	15	1	......	7	1	......	16	......	......	23	95	1	5	1	7
Little Arm	LaVk-2	Zone B	9	1	......	21	......	......	8	......	......	......	17	......	......	8	......	......	9	......	......	41	......	......	36	150	1	2	......	3
	KkVa-2	Zone B	......	......	......	4	......	......	......	......	......	......	12	......	......	4	......	......	11	......	......	8	......	......	8	47	2	......	......	2
	JiVs-2	Zone F2	......	......	......	......	......	......	1	......	......	......	2	1	......	......	......	......	3	......	......	1	......	......	2	10	1	......	......	1
	JiVs-1	Level 5	37	1	......	23	1	......	4	2	......	2	56	3	2	166	1	1	31	2	1	125	2	......	138	598	5	2	......	7
	KfVd-2	Floor 3	6	......	......	3	2	......	1	......	......	......	1	......	......	1	......	......	......	......	......	2	......	......	4	20	......	......	......	......
Champagne	KfVd-2	Floor 4	1	......	......	1	1	......	......	1	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	4	......	......	......	......
	KfVd-2	Floor 5	2	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	1?	3	......	......	......	......
Kluane	JhVq-1	Zone G	3	......	......	2	......	......	......	......	......	......	......	......	......	1?	......	......	......	......	......	......	......	......	......	6	......	......	......	......
	TOTALS		153	11	3	212	17	4	48	6	2	5	106	4	2	214	2	1	85	3	1	245	2	1	277	1404	12	15	9	36

Table 15

Distribution of Blades, Microblades and Cores in Surface Components

Phase	Surface Component	Layer or Level	BLADES: Truncated: no retouch	BLADES: Truncated: 1 edge retouch	BLADES: Truncated: 2 edge retouch	BLADES: Thin Prismatic: no retouch	BLADES: Thin Prismatic: 1 edge retouch	BLADES: Thin Prismatic: 2 edge retouch	BLADES: Thick Prismatic: no retouch	BLADES: Thick Prismatic: 1 edge retouch	BLADES: Thick Prismatic: 2 edge retouch	BLADES: others	MICROBLADES: Thick Truncated: no retouch	MICROBLADES: Thick Truncated: 1 edge retouch	MICROBLADES: Thick Truncated: 2 edge retouch	MICROBLADES: Thin Truncated: no retouch	MICROBLADES: Thin Truncated: 1 edge retouch	MICROBLADES: Thin Truncated: 2 edge retouch	MICROBLADES: Thick Prismatic: no retouch	MICROBLADES: Thick Prismatic: 1 edge retouch	MICROBLADES: Thick Prismatic: 2 edge retouch	MICROBLADES: Thin Prismatic: no retouch	MICROBLADES: Thin Prismatic: 1 edge retouch	MICROBLADES: Thin Prismatic: 2 edge retouch	MICROBLADES: crude microblades	TOTAL blades and microblades	POLYHEDRAL CORES: tongue-shaped	POLYHEDRAL CORES: conical	POLYHEDRAL CORES: tabular	TOTAL polyhedral core
Taye Lake	KbVa-1		1																						1	2				
	JeVc-6				1																					1				
	JcVe-1															1									3	4			1	1
	KkVa-1		1																						1	2				
	JfVb-5		2			5		1		1																9				
	JfVb-1		1	1																						2				
	HjRr-1						1																			1				
	JfVb-7			1		2																				3				
	KiVc-1					2			1																	3				
	KfVh-1					1						1														2				
	JeVc-2		1			6		2	3																	12				
	JcUj-1		1									1										2			1	5				
	JeVc-4		7	1	1	8				1	1					1			1			1	1			23				
Gladstone	JjVj-5									1												1				2				
	JjVi-5																								1	1				
	JhVf-1																					1				1				
	JjVj-3					1			1				1			1									1	5				
	JfVg-3		2			9		1	1				1			1						1			6	22		1	1	2
	JeVc-1		1	1		1							2			1						1			1	8				
Little Arm	JjVj-2									1			1													2				
	JeVc-5								1				1												1	3				
	JiVg-1		1										1						1						1	4				
	JjVi-2																		1							1				
	JeVi-1												2	1		2			1						2	8	2			2
	KjTx-1										1											1			1	3				
	KaVa-1												1			1						1			1	4				
	JhVh-1																		1							1				
	KeVd-3																										1			1
	TOTALS		18	4	2	35	1	4	7	4	2	2	10	1		8			5			9	1		21	134	3	1	2	6

cores from excavated components were laid out by level, three types, with stratigraphic significance, were apparent. Tabular and conical cores appeared together in the later levels; tongue, conical, and tabular in the middle levels and tongue and conical in the earliest levels. There is the possibility that these may have been preceded by a period with only conical cores.

Of course, a possible range of blades or microblades can be struck from any single core. However, since some of the polyhedral surfaces of some tabular and conical cores are almost flat or very slightly convex in cross-section and since tongue-shaped cores have a polyhedral surface almost pointed in cross-section, it is apparent that the kind of blade or microblade most frequently struck from each kind of core will differ in thickness and width. The degree of convexity of dorsal surface of a prismatic blade or microblade or the angle made by two lateral dorsal surfaces of a truncated blade are directly related to the convexity of the surface of the core. After considerable experimenting, we have tentatively analyzed these microblades or blades into types which we believe reflect, to some degree, the temporal differences in cores. The angle of the two lateral dorsal surfaces determined whether the blade type was described as thick or thin. This is a diagnostic feature of some of these types. Eventually, we hope that more sites with adequate core samples associated with a large number of microblades will permit better definition and classification of blades and microblades.

Polyhedral Cores
(Tables 14 and 15)

Tongue-Shaped Polyhedral Cores
Fig. 89, Nos. 33 to 36. Sample: 15 specimens

Form and Chipping Technique. All of these are roughly tongue-shaped. The end opposite the tip, i.e., the base of the "tongue," has a flat surface which was the striking platform for the removal of microblades. The flat wider surfaces usually bear only one or two flake scars on them. The tip of the tongue has retouching on it to give it a sharp edge. Two cores have been flattened by burin-like blows similar to Japanese, i.e., Shirataki cores. One, however, appears to have been made from a biface tool, in the Ybetsu technique (Yoshizaki 1959). Seven specimens have polyhedral fluting along one narrow lateral edge. These extend from the flat basal striking platform down to the sharpened tip. Four have fluted polyhedral surfaces on both narrow lateral edges. The striking platform is often at right angles to the fluted surface. The polyhedral surface, in cross section in all but one, is noticeably convex and almost pointed. One core from a Taye Lake site (Callison, IeSh-1), is somewhat different in that the fluted surface on its lateral edge is almost flat in cross section.

Dimensions. Length, 24-42 mm., average 28 mm.; width, 25-35 mm., average 32 mm.; maximum thickness, 8-16 mm., average 10 mm.

Geographical and Temporal Relationships. These tongue-shaped cores appear mainly in the Little Arm complex but they last as a minority core type into both the Gladstone and Taye Lake complexes. They are very numerous at the Campus (Nelson 1937; Rainey 1939) and Pointed Mountain sites (MacNeish 1954) in the northwestern interior, and a few have been reported from Arctic Small Tool Tradition sites in the Arctic. They have their maximum concentration in northeastern Siberia and Outer Mongolia (Maringer 1950).

Conical Polyhedral Cores

Fig. 89, Nos. 28 to 30. Sample: 16 specimens

Form and Chipping Technique. Seven of these cores are conical in shape and five are in the shape of a cone cut in half longitudinally. The base of the cone served as the striking platform which is usually at an acute angle to the fluted surface. The parallel ridges of the fluted surface have a tendency to converge as they approach the tip of the core.

Dimensions. Length, 24-65 mm., average 36 mm.; width, 15-44 mm., average 30 mm.; thickness, 10-28 mm., average 17 mm.

Geographical and Temporal Relationships. This is a common type that was made over much of North America and Asia during a long period of time. In the Yukon it certainly was present by Little Arm times but it may have been present during the Kluane horizon. It lasted on into the Taye Lake horizon.

Tabular Polyhedral Cores

Fig. 89, Nos. 31 and 32. Sample: 11 specimens

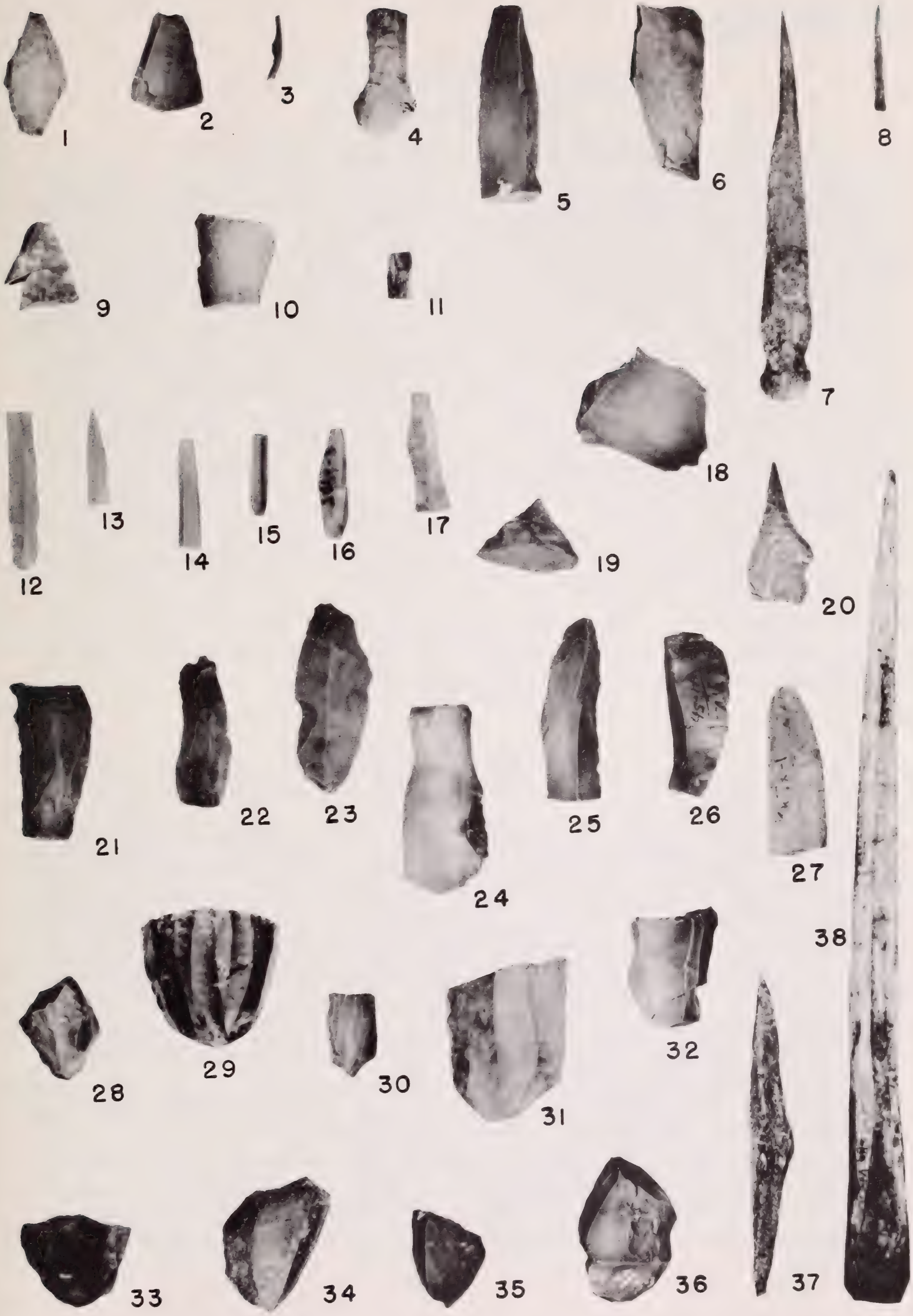
Form and Chipping Technique. All these were made from flat flakes one wide surface of which was fluted. The fluted surface varies from flat to very slightly convex. One end is the striking platform, which varies from lying at an acute to a right angle with the polyhedral surface.

Dimensions. Length, 30-54 mm., average 40 mm.; width, 18-36 mm., average 26 mm.; thickness, 8-21 mm., average 11 mm.

Geographical and Temporal Relationships. These occur in the Gladstone and Taye Lake complexes.

Fig. 89. Burins, microblades, drills, blades, cores, and awls. Scale about one-half natural size.

1. Flint Creek burin (JiVs-1/10-5a)
2. Artifacts burin made on an end scraper (LaVk-2/10)
3. Ft. Liard flake burin and its burin spall (JiVs-1/42-3b)
4. Ft. Liard flake burin and its burin spall (JiVs-1/42-3b)
5. Burin made on a thick prismatic blade (KfVh-1)
6. Ft. Liard flake burin (KfVd-2/1)
7. Fibula awl (NfVd-2)
8. Copper awl (JiVs-1/6-2f)
9. Artifact burin made on projectile point (JhVq-1/4F3-5)
10. Burin on a microblade (Anaktuvuk type) (JiVs-1/37-5d)
11. Thin prismatic microblade with notched base (JiVs-151-5a)
12. Thick prismatic microblade (JiVs-1/1)
13. Thin truncated microblade (JeVi-1)
14. Thick truncated microblade (JfVb-7)
15. Crude microblade (XI-B-178)
16. Crude microblade (JiVs-1)
17. Perforator (JhVq-1/38f-2)
18. Graver (JiVs-1/41-5f)
19. Artifact burin made on projectile point (JeVc-2)
20. Unifacial drill (KfVd-1)
21. Truncated blade (LeSh-1)
22. Truncated blade (KfVd-2/3-3c)
23. Thin prismatic blade (KfVd-2/3-4b)
24. Thin prismatic blade (LaVk-2/15)
25. Thick prismatic blade (JjVj-3)
26. Thick prismatic blade (ZiVs-1/41-5h)
27. Thick prismatic blade (KkTx-1)
28. Conical core (XI-B-139)
29. Conical core (SiVs-1/4-4b)
30. Conical core (XI-B-135)
31. Tabular core (JcVe-1)
32. Tabular core (JiVs-1/34-4a)
33. Tongue-shaped core (KkVa-2)
34. Tongue-shaped core (IeSh-1)
35. Tongue-shaped core (JiVs-1)
36. Tongue-shaped core (JfVg-1)
37. Lashed awl or point (KfVd-3/3-3b)
38. Long bone awl (KeVd-1)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Blades

Truncated Blades

Fig. 89, Nos. 21 and 22. Sample: 191 specimens

Form and Chipping Technique. These are long rectangles or ovoids. They are flat with two or more irregular ridges on their convex dorsal surfaces. The ventral surface is flat, except for a convex bulb of percussion at one end. Although such types of blades could be occasionally struck from tongue-shaped polyhedral cores, most of the blades would not be of this type. However, tabular and conical cores with a low degree of fluted surface convexity would usually yield this type of blade. A few of these blades represent variants within the type. Three have two of their lateral edges dorsally retouched, and 14 have one edge dorsally retouched. One is a burin and one end-of-blade scraper was made from this type. Perhaps when more comparative data is available, these reworked specimens may justifiably become types.

Dimensions. Length, 31-53 mm., average 38 mm.; width, 11-29 mm., average 21 mm.; thickness, 4-13 mm., average 7 mm.

Geographical and Temporal Relationships. In the southwestern Yukon, this type of blade is found in greatest numbers in the Gladstone and Taye Lake complexes, the majority being in the latter. However, it is present in the Kluane complex and continues into the Champagne and Little Arm complexes. It has a wide distribution in North America.

Thin Prismatic Blades

Fig. 89, Nos. 23 and 24. Sample: 273 specimens

Form and Chipping Technique. These blades are low flat prisms, ovoid to rectangular in outline, with a single irregular dorsal ridge. The sides are roughly parallel, and the ventral surfaces are almost flat except for the bulb of percussion. These blades were probably struck from tabular cores and their process of manufacture was probably similar to the previously described type. In rare cases they could have come from conical cores. Variants within this type reveal that two have been pointed by dorsally chipping their lateral edges on the end opposite the bulb of percussion. Eighteen have one lateral edge dorsally retouched, and six have two lateral edges dorsally retouched.

Dimensions. Length, 4-60 mm., average 29 mm.; width, 6-23 mm., average 12 mm.; thickness, 1-7 mm., average 3 mm.

Geographical and Temporal relationships. Although a few of these do occur in the Kluane, Champagne, and Little Arm complexes, they are a rarity. They noticeably increase during Gladstone times and reach dominance in the Taye Lake horizon. The type is widespread over North America.

Thick Prismatic Blades

Fig. 89, Nos. 25 to 27. Sample: 76 specimens

Form and Chipping Technique. These blades are much like the previous one, except that they are very much thicker and the dorsal ridge is straighter and is parallel to the lateral edges. It is difficult to determine the exact type of core they could have come from, other than that the core would have to be large in size. Probably it was a conical core. The three largest in level 5 from the Little Arm site appear to have been struck from the edge of a bifacial blade. There also are nine having one dorsal edge retouched and four with two dorsal edges retouched. Many of the end of blade scrapers, to be mentioned later, were manufactured from this type of blade and two have been made into burins.

Dimensions. Length, 27-85 mm., average 51 mm.; width, 6-18 mm., average 11 mm.; thickness, 3-11 mm., average 7 mm.

Geographical and Temporal Relationships. This type of blade is found in the Champagne, Little Arm, Gladstone and Taye Lake complexes in the southwestern Yukon, being most numerous in the latter. They also have a wide distribution over much of North America.

Microblades

Thick Truncated Microblades

Fig. 89, No. 14. Sample: 123 specimens

Form and Chipping Technique. These are long, ovoid or rectangular in outline. They are relatively narrow and thick. On the dorsal surface there are two or more ridges which are very straight and parallel to the lateral edges. The angle of the slope of the two outside lateral (the surfaces between the edge and first ridge on either side) and dorsal surfaces falls between 50° and 90°. It is believed that most of these microblades were struck from tongue-shaped polyhedral cores. Four have retouching along one edge and two are retouched on both edges.

Dimensions. Length, 15-36 mm., average 22 mm.; width, 3-11 mm., average 7 mm.; thickness, 1-1 mm., average 2.5 mm.

Geographical and Temporal Relationships. These are present mainly in the Little Arm complex but a few lasted into the Gladstone complex. These are found mainly in interior Alaska and the Yukon but a few have been found in British Columbia, the Northwest Territories, and Alberta.

Thick Prismatic Microblades
Fig. 89, No. 12. Sample: 94 specimens

Form and Chipping Technique. These microblades are rectangular or elongate ovoids in outline and triangular in cross-section. The dorsal surface has a single ridge parallel to the edges. The blades are thick and narrow, the angle formed by the two lateral dorsal surfaces always being less than 90^{o}. I suspect that most of these come from tongue-shaped polyhedral cores but a few could have been struck from conical cores and cuboid cores. Two have retouching on one edge and one has retouching on two edges.

Dimensions. Length, 6-54 mm., average 22 mm.; width, 2-10 mm., average 5.6 mm.; thickness, 1-5 mm., average 2.5 mm.

Geographical and Temporal Relationships. These microblades are found in the Taye Lake, Gladstone, and Little Arm complexes, being most common in the latter. They had a slightly wider distribution for they not only are found in Alaska, Yukon, Northwest Territories, Alberta, and British Columbia but a few have been reported from the State of Washington and some appear in early horizons in the tundra area of Alaska, Canada, and Greenland.

Thin Truncated Microblades
Fig. 89, No. 13. Sample: 225 specimens

Form and Chipping Technique. These microblades are rectangular to elongate ovoid in outline with two or more ridges on their dorsal surfaces. The ridges are roughly parallel to edges. The angle made by the slope of the two outside lateral surfaces is usually from 90^{o} to 110^{o}. The microblades are therefore thin and relatively wide. These proportions suggest they rarely come from tongue-shaped cores but more commonly were struck from conical or tabular cores, or the Arctic Small Tool cuboid type. Three are retouched on one edge and one on two edges. Two were made into burins.

Dimensions. Length, 4-20 mm., average 18 mm.; width, 3-10 mm., average 7 mm.; thickness, 1-3 mm., average 2 mm.

Geographical and Temporal Relationships. In southwestern Yukon these microblades are most common in the Little Arm complex, although a few occur with Taye Lake and Gladstone materials. They are very common at Pointed Mountain (MacNeish 1954) and the Campus site (Rainey 1939) and one was found with the N. T. Docks complex in the west end of Great Bear Lake (MacNeish 1955a). This type is, also, the most common variety in the Arctic, both in the Arctic Small Tool Tradition as well as the Dorset Tradition (Collins 1956).

Thin Prismatic Microblades
Fig. 89, No. 11. Sample: 258 specimens

Form and Chipping Technique. Prismatic, thin microblades are small and rectangular to lenticular in outline. They usually have a single straight ridge on their dorsal surface, which is parallel to the lateral edges. There is a general tendency for the end opposite the striking platform to be somewhat pointed. The angle made at their two lateral dorsal surfaces is always more than 90^{o}. Their relative thinness suggests they more commonly come from tabular or conical cores and very rarely from tongue-shaped cores. Four are retouched on one edge and one on two edges.

Dimensions. Length, 5-62 mm., average 22 mm.; width, 3-10 mm., average 7 mm.; thickness, 1-3 mm., average 2 mm.

Geographical and Temporal Relationships. These are distributed from the Little Arm complex into the Taye Lake complex in the southwest Yukon and are common through the Northwest and Arctic in cultures which include microblades.

Crude Microblades
Fig. 89, Nos. 16 and 17. Sample: 298 specimens

Form and Chipping Technique. These roughly rectangular microblades have from one to five roughly parallel ridges on their dorsal surfaces. Generally speaking, these ridges are not straight, nor are they always parallel to the lateral edges. It is difficult to determine just what type of core they were struck from, but the neatness of the fluting on tongue-shaped cores suggest they did not come from this type. A few are so crude that there is some doubt as to whether they come from polyhedral cores at all.

Dimensions. Length, 7-19 mm., average 14 mm.; width, 6-10 mm., average 8 mm.; thickness, 1-3 mm., average 1.5 mm.

Geographical and Temporal Relationships. These microblades are common in the Taye Lake, Gladstone, and Little Arm complexes in southwestern Yukon. They also occur at Pointed Mountain (MacNeish 1954) and in the N.T. Docks complex (MacNeish 1955) in the Northwest Territories, and at the Campus site (Rainey 1939) in interior Alaska. However, they seem to be most common in the Arctic coastal plain and appear to be the dominant type in the New Mountain phase on the Firth River in northern Yukon (MacNeish 1956a), in Cape Denbigh (Giddings 1951), in related sites in Alaska (Irving 1953), in Dorset (Collins 1956), and in Denbigh-like complexes in northern Canada and Greenland (Knuth 1954; Larsen and Meldgaard 1958).

Burins, Burin Spalls, Perforators, Drills, Awls, and Pins
Table 13

The 64 artifacts described and classified below are all tools which are used to bore holes or cut grooves. These do not make a neat class nor is each type represented by an adequate sample. In spite of these difficulties they do show rather distinct temporal distributions and are of assistance in marking off the time periods and cultural phases. Artifact and Fort Liard burins, and fibula awls last from Champagne to Taye Lake times. Unifacial drills, lashed antler points or awls, gravers, and Flint Creek multiburins occur only during Little Arm times. Secondary burin spalls occur in Gladstone and Little Arm complexes while Anaktuvuk blade burins and perforators occur in Little Arm, Gladstone, and Taye Lake complexes. Beaver tooth gouges occur in Gladstone and Bennett Lake complexes. Split bone awls occur in Taye Lake and Bennett Lake complexes while bird bone awls, copper awls (?), and copper pins are confined to the Bennett Lake complex.

Following Bourlon (1911), Burkitt (1933), Noone (1934) and others, a burin is defined as a thin object of stone that has received a percussion blow or blows which removed a narrow spall or spalls from all or parts of its edge and left a negative bulb of percussion just below the junction of its striking platform and its newly formed faceted edge or edges. Burins are described by means of a complicated burin terminology as follows: end, lateral edge, surface, transverse axis, burin blow, burin facet, burin spall, trimming, scaling or retouching, a striking platform, reverse or negative bulb of percussion and bulb of percussion.

Although a burin is basically defined by its technique of manufacture the very word itself burin, infers that the function of the tool is important and in reality becomes a secondary definition. Since the burin blow leaves a negative bulb of percussion which forms a scoop-shaped cutting edge, it follows that when a burin is drawn toward the user against an object of bone, antler, wood or some soft material it excises a groove. A few pieces of bone or antler in collections from horizons with burins show scars which indicate one of the functions of burins was to split antler and bone. Since burins occur only in horizons with blades or microblades it has been assumed that another function of the burin was to cut slots in bone into which could be inserted blades or microblades.

Fort Liard Burins
Fig. 89, Nos. 3, 4, and 6. Sample: 13 specimens

Form and Chipping Technique. These are all made from elongate flat flakes. Ten of them have been struck on one end so that one or more burin spalls have been removed from one lateral edge parallel to the transverse axis. In only one case was the striking platform prepared by trimming. Three received burin blows at an oblique angle to the trans-

verse axis. Eight received two burin blows, four only one and one was dealt three. Five have trimming on the edge opposite the one with the facet.

Dimensions. Length, 20-51 mm., average 33 mm.; width, 7-35 mm., average 19 mm.; thickness 3-11 mm., average 6 mm.

Geographical and Temporal Relationships. In the southwest Yukon these occur in the Champagne, Little Arm, Gladstone, and Taye Lake complexes. Broken fragments from in front of the Kluane Lake level hints that they were made somewhat earlier. They occur with microblades at the Campus site (Irving 1955), at Pointed Mountain (MacNeish 1954), in N. T. Docks (MacNeish 1955) and in Lockhart River sites (Harp 1959). They rarely appear in the Arctic Small Tool tradition sites in the Arctic but are common in the Flint Creek horizon on the Firth River (MacNeish 1956a). They are present in early horizons in British Columbia (Borden 1960), Washington and Oregon (Cressman 1960). More recently a few have been reported from California, Texas, and Mexico apparently on early horizons. Similar ones are also known from the Paleolithic or Siberia (Tolstoy 1958).

Flint Creek Multiburins
Fig. 89, No. 1. Sample: 2 specimens

Form, Chipping Technique and Dimensions. These bifacially chipped burins are 38 and 42 mm. long,20 and 23 mm. wide, and about 10 mm. thick. The small one has had two burin spalls removed from each of its lateral edges at an acute angle to its transverse axis. The opposite end had one burin spall removed from one lateral edge and two spalls were removed from the opposite lateral edge. Both these spalls are at an acute angle to the transverse axis. The other burin had three spalls removed from one end on one side and a single spall removed from the opposite end on the same side.

Geographical and Temporal Relationships. Both specimens were found in a Little Arm component and they are common in the Flint Creek phase on the Yukon Arctic coast (MacNeish 1956a).

Anaktuvuk Microblade Burins
Fig. 89, No. 10. Sample: 5 specimens

Form and Chipping Technique. Four of these burıns were made on microblades and one on a blade which had been snapped in the middle. On the small ones the broken snapped end has served as a striking platform for the removal of a burin spall from one lateral edge. One has a trimmed edge on the opposite side from the burin facet.

Dimensions. Length, 15-59 mm., average 41 mm.; width, 8-18 mm., average 12 mm.; thickness, 2-11 mm., average 8 mm.

Table 16

Distribution of Drilling and Gouging Tools

Phase	Excavated Components	Surface Components	Layer or Level	Fort Liard burin	Flint Creek multiburin	Anaktuvuk microblade burin	Artifact burin	Burin spall	Unifacial drill	Graver	Point flakes	Fibula awl	Lashed antler awl or point	Split bone awl	Long bone awl	Copper awl	Copper pin	Beaver tooth gouge	TOTAL
Bennett	JiVs-1		Level 1	....	....	....	....	....	....	....	....	....	....	2	2	2	1	2	9
	JhVf-4		Zone A	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	3
		KeVd-1	Surface	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
Taye Lake	JiVs-1		Level 3	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2
		JeVc-6	Surface	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
		KfVh-1	Surface	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
		JeVc-2	Surface	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
	KfVd-2		Floor 1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	2
	JfVg-1		Level 4-11	....	....	....	....	....	....	....	....	2	....	1	....	....	....	....	3
Gladstone	JhVq-1		Zone F3	....	....	....	2	....	....	....	1	....	....	....	....	....	....	1	4
	JiVs-1		Level 4	2	....	....	....	1	....	....	....	....	....	....	....	....	....	....	3
		JeVc-1	Surface	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2
Little Arm	LaVk-2		Zone B	2	....	....	1	....	....	....	1	....	....	....	....	....	....	....	4
	KkVa-2		Zone B	....	....	....	2	2	....	....	....	....	....	....	....	....	....	....	4
	JiVs-2		Zone F2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	JiVs-1		Level 5	4	2	2	....	3	2	3	....	....	....	....	....	....	....	....	16
	KfVd-2		Floor 3	1	....	....	....	....	1	....	....	....	1	....	....	....	....	....	3
Champagne	KfVe-1		Level 2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	KfVd-2		Floor 4	....	....	....	1	....	....	1?	....	1	....	....	....	....	....	....	3
	TOTALS			13	2	5	7	6	3	4	3	4	1	5	5	2	1	3	64

Temporal and Geographical Relationships. These are distributed from Little Arm to Taye Lake times in the southwest Yukon and are common in the Arctic in the Dorset culture and the Arctic Small Tool tradition.

Artifact Burins

Fig. 89, Nos. 2 and 9. Sample: 7 specimens

Form and Chipping Technique. Four of these are made on scrapers and three on the bodies of projectile points. The four scrapers have had a spall removed from one lateral edge, at an acute angle to transverse axis, by a blow struck at its basal edge. One projectile point body has had three spalls removed from one lateral edge by blows at an acute angle to its axis. The other two point bodies were struck each with a single blow which removed a spall parallel to the main axis along one edge. The opposite edges have blows parallel to the main axis. These removed spalls in a reverse direction.

Dimensions. Length, 27-41 mm., average 31 mm.; width, 21-28 mm., average 25 mm.; thickness, 9-13 mm., average 11 mm.

Geographical and Temporal Relationships. These artifact burins are found in the Little Arm and Gladstone complexes. They also were found in the Lockhart River site (Harp 1960).

Secondary Burin Spalls

Fig. 89, No. 3. Sample: 6 specimens

Form and Chipping Technique. These are all flat rectangular flakes with two parallel vertical edges. On one surface at one end there is a bulb of percussion. The opposite surface is flat or slightly convex.

Dimensions. Length, 9-28 mm.; width, 5-7 mm.; thickness, 1-3 mm.

Geographical and Temporal Relationships. These are found in the Little Arm and Gladstone complexes in the southwest Yukon. They have not been found elsewhere in the northwest interior, but they are quite numerous in sites of the Arctic Small Tool Traditionin the Arctic.

Unifacial Drill

Fig. 89, No. 20. Sample: 3 specimens

Form and Chipping Technique. All three of these were made out of large elongate wide blades and are unifacially chipped. Only one is complete. It is a long flaring-based drill made from a flat flake. The drill tip is half the length of the body, and the body itself is roughly square. One surface has percussion flaking on it, and the drill tip on the same

surface bears pressure flaking. The other surface is without percussion flaking, although it does have some pressure retouching near its tip.

Dimensions. Length 44 mm. to more than 63 mm.; width, 32 mm.; thickness, 3-6 mm., average 4 mm.

Geographical and Temporal Relationships. These are found in Little Arm sites.

Gravers

Fig. 89, No. 18. Sample: 4 specimens

Form, Chipping Technique and Dimensions. The two complete ones are both made from flat (5 and 8 mm. thick), irregular shaped flakes (32 and 42 mm. wide, 33 and 42 mm. long). One of the longer edges bears unifacial retouching and in the center of this retouching is a small graver point about 3 mm. wide and from 2 to 3 mm. long. The tip on the large perforator is slightly beveled.

Geographical and Temporal Relationships. The better ones were found in a Little Arm layer but a possible one appeared in Floor 4 of the Pelly Farm site (KfVd-2). This latter is a Champagne component.

Point Flakes

Sample: 3 specimens

Form, Chipping Technique, and Dimensions. Two of these are small fragments, but one is a relatively large, roughly triangular flake 50 mm. high and 43 mm. wide. All are thin (10-16 mm.) and bear unifacial chipping which produces a long tapering tip.

Geographical and Temporal Relationships. One each was found in Little Arm, Gladstone, and Taye Lake complex levels.

Fibula Awls

Fig. 89, No. 7. Sample: 4 specimens

Form, Manufacturing Technique and Dimensions. These are all made from the fibula of a relatively large mammal (buffalo or moose?). The proximal joint has been retained and the opposite end has been ground to a point. The range in length is from 97 mm. to over 130 mm., in width from 9 to 16 mm., and in thickness from 5 to 10 mm.

Geographical and Temporal Relationships. These awls appear in the Champagne and Taye Lake horizons.

Lashed Awl or Point
Fig. 89, No. 37. Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. This object is made by cutting or grinding off one-half of a long bone of a large mammal. One side of it is the exterior of the bone. On the other side two facets have been ground flat and to an acute angle with the main axis of the bone. These facets extend from the center to each end. One end has been ground to a point. In the center of the artifact at the junction of the ground facets, there is a notch which suggests that the point was lashed to some variety of beveled shaft. Whether this was a hafted awl or some sort of hafted projectile point is difficult to say. Similar objects are unknown in the north. It is 102 mm. long, 13 mm. wide, and 9 mm. thick.

Geographical and Temporal Relationships. This point was found in a Little Arm component.

Split Bone Awls
Sample: 5 specimens

Form and Manufacturing Technique. All five small fragments have been made from split mammal long bones which have been ground to a point on one end.

Geographical and Temporal Relationships. Although they have been found only in the Taye Lake and Bennett complexes in the Yukon, such awls are very common throughout North America.

Long Bone Awls
Fig. 89, No. 38. Sample: 5 specimens

Form, Manufacturing Technique, and Dimensions. Four of these awls are fragmentary and the fifth is 250 mm. long, 30 mm. wide, and 15 mm. thick. All are made from long bones which were first cut to points and then sharpened by grinding.

Geographical and Temporal Relationships. They were found in the Bennett Lake horizon.

Copper Awls
Sample: 2 specimens

Form, Manufacturing Technique, and Dimensions. Both of these were beaten out of native copper. First, pieces 42 and 33 mm. in length, and 4 mm. square in cross-section were made, then one end was ground to a point.

Geographical and Temporal Relationships. They were found in Bennett Lake horizons.

Table 17

Distribution of End Scrapers in Excavated Components

Phase	Excavated Components	Layer or Level	Scraper plane	Keeled end scraper	Flake end scraper	End-of-the-blade	Neatly-made plano-convex ovoid	Flat-topped snub-nosed	Chi-tho	Ovoid plano-convex	Crude plano-convex	Notched	Thumbnail	Long bone flesher	Gunflint scraper	Bottle glass end scraper	TOTAL
Bennett	JbUq-1	Zone A	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	3	.....	1	.....	6
	JfVb-4	Level 1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	4	.....	.....	.....	6
	JiVs-1	Level 1-2	.....	.....	1	.....	.....	.....	10	.....	.....	.....	8	1	.....	.....	20
	JhVf-4	Zone A	.....	.....	3	.....	.....	1	16	2	.....	.....	12	.....	.....	.....	34
Aishihik	JiVs-3	Zone B	.....	.....	.....	.....	.....	2	2	1	.....	1	2	.....	.....	.....	8
	JhVq-1	Zone C	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	JhVf-5	Level 2	.....	.....	.....	.....	.....	1	6	.....	.....	.....	1	.....	.....	.....	8
	JfVg-1	Level 1-3	.....	.....	.....	.....	.....	1	2	.....	.....	.....	2	.....	.....	.....	5
Taye Lake	JiVs-5	Zone E	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	JiVs-1	Level 3	.....	.....	.....	.....	.....	6	2	.....	1	.....	.....	.....	.....	.....	9
	JfVb-4	Level 3-4	.....	.....	4	6	.....	16	1	.....	10	2	.....	.....	.....	.....	39
	IeSh-1	Level 2	.....	.....	2	5	.....	11	.....	2	3	1	.....	.....	.....	.....	24
	KfVd-2	Floor 1	.....	.....	2	3	.....	10	3	.....	5	2	.....	.....	.....	.....	25
	JfVg-1	Level 4-11	.....	1	2	3	.....	4	3	.....	1	.....	.....	.....	.....	.....	14
Gladstone	JgVp-1	Zone F	.....	.....	3	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	6
	KfVd-2	Floor 2	.....	1	.....	.....	.....	3	.....	1	.....	.....	.....	.....	.....	.....	5
	JhVq-1	Zone F3	.....	1	5	5	.....	31	2	2	1	.....	1?	.....	.....	.....	48
	JiVs-1	Level 4	.....	.....	.....	1	.....	2	1	1	.....	.....	.....	.....	.....	.....	5
Little Arm	LaVk-2	Zone B	.....	5	5	5	1	5	1	.....	.....	.....	.....	.....	.....	.....	22
	KkVa-2	Zone B	.....	1	1	.....	1	1	.....	1	.....	.....	.....	.....	.....	.....	5
	JiVs-2	Zone F2	.....	2	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
	JiVs-1	Level 5	.....	3	3	.....	2	.....	1	.....	.....	.....	.....	.....	.....	.....	9
	KfVd-2	Floor 3	.....	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3
Champagne	KfVd-2	Floor 4	.....	7	4	3	.....	1?	.....	.....	.....	.....	.....	.....	.....	.....	15
	KfVd-2	Floor 5	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Kluane	JhVq-1	Zone G	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	TOTALS		2	23	38	33	5	99	53	11	21	6	33	1	1		326

Table 18

Distribution of End Scrapers in Surface Components

Phase	Surface Components	Scraper plane	Keeled end scraper	Flake end scraper	End-of-the-blade	Neatly-made plano-convex ovoid	Flat-topped snub-nosed	Chi-tho	Ovoid plano-convex	Crude plano-convex	Notched	Thumbnail	Long bone flesher	Gunflint scraper	Bottle glass end scraper	TOTALS
Bennett	JbUq-2	....	....	1	....	....	....	4	....	....	....	3	....	....	....	8
	JhVf-9	....	1	....	....	....	....	1	....	....	....	1	....	....	....	3
	KeVd-1	....	....	....	....	....	....	....	....	....	....	1	....	....	1	2
	KfVd-3	....	....	....	....	....	....	1	....	....	....	1	....	....	....	2
	JjVi-1	....	....	1	....	....	....	3	....	....	....	1	....	....	....	5
	JkUs-1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2
	JhVf-3	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	JdUi-1	....	....	1	....	....	....	3	....	....	....	....	....	....	....	4
Aishihik	KeVd-2	....	....	....	....	....	1	....	1	....	....	3	....	....	....	5
	JjVi-3	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	JbUr-1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	JaUe-1	....	....	....	....	....	1	....	2	....	....	....	....	....	....	3
Taye Lake	JeVc-6	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JcVe-1	....	....	....	1	....	3	....	....	....	....	....	....	....	....	4
	JfVb-5	....	....	....	....	....	2	....	....	1	....	....	....	....	....	3
	JfVb-1	....	....	....	....	....	1	1	....	3	....	....	....	....	....	5
	HjRr-1	....	....	....	1	....	3	....	1	....	....	....	....	....	....	5
	JfVb-7	....	....	....	1	....	1	....	....	2	....	....	....	....	....	4
	KiVc-1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	KfVh-1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	2
	JeVc-2	....	....	1	....	....	3	1	1	....	....	....	....	....	....	6
	JeVc-4	....	....	....	....	....	3	....	1	....	....	....	....	....	....	4
Gladstone	JjVj-5	....	....	....	....	....	2	....	....	....	....	....	....	....	....	2
	JhVf-1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JfVg-3	....	....	....	1	....	1	....	1	....	....	....	....	....	....	3
Little Arm	JjVj-2	....	2	....	....	....	1	....	....	....	....	....	....	....	....	3
	JeVc-5	....	1	....	....	....	1	....	2	....	....	....	....	....	....	4
	JjVi-2	....	2	1	....	....	....	....	....	....	....	....	....	....	....	3
	JeVi-1	....	....	....	....	....	1	....	1	....	....	....	....	....	....	2
	JhVh-1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Champagne	KjTx-3	....	....	....	....	3	1	....	1	....	....	....	....	....	....	5
	JgVd-1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
	JbUq-6	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
	JeVc-3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JiVs-4	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
	JhVf-6	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2
	JjVj-4	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
	JbUq-4	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
Unclassified Sites	JjVj-1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
	JfVb-6	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
	JfVb-3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JdUp-1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	JcUi-1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
	KeVh-1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
	IwTl-1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JhVf-2	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JhVf-7	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
	JcUn-1	....	....	....	....	2	1	....	....	1	....	....	....	....	....	4
	JfUm-1	....	....	....	....	....	1	2	....	....	....	....	....	....	....	3
	KkVa-3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	JfVc-1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
	JgVp-1	....	....	....	....	....	5	....	1	....	....	....	....	....	....	6
	JhVr-1	....	....	....	....	....	....	2	....	1	....	....	....	....	....	3
	JjVj-6	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
	JfVb-3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	Others	....	1	....	....	....	5	....	....	....	....	....	....	....	....	6
	TOTALS		11	5	4	9	46	24	12	12		15			1	139

Copper Pin
Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. A small piece of native copper beaten to form a bar 16 mm. long and 1 mm. square in cross-section. The two ends were ground to points.

Geographical and Temporal Relationships. It was found in a Bennett Lake component.

Beaver Tooth Gouge
Sample: 3 specimens

Form and Manufacturing Technique. Three small fragments of tips of beaver incisors show posthumous grinding of the lingual surface of the tip. It is believed these were parts of beaver tooth gouges.

Geographical and Temporal Relationships. Two were the Bennett complex but one is found in the much earlier Gladstone complex.

End Scrapers
Tables 17 and 18

In the excavation, 326 end scrapers were found. These have been classified into 13 types. 139 more were collected from the surface. The terminology for scrapers and the technique of establishing types has been previously developed (MacNeish 1958b).

Although our sample is not large at all horizons and many of the types last through more than one horizon, scrapers serve as fairly good time markers. Scraper planes occur only in the Kluane complex. Keeled scrapers occur mainly in the Champagne and Little Arm complexes while neatly-made plano-convex end scrapers occur only in the Little Arm complex. Flake end scrapers and end-of-blade scrapers last from Champagne into the Taye Lake complex as do flat-topped triangular end scrapers. Chi-thos and round plano-convex end scrapers last from the Little Arm complex to Bennett Lake complex. Crudely chipped, large, plano-convex end scrapers and notched end scrapers occur in the Gladstone and Taye Lake complexes. Thumbnail scrapers occur in the Aishihik and Bennett complexes. Long bone fleshers and scrapers made from glass or gunflints occur only in the Bennett Lake complex.

Scraper Planes
Fig. 90, No. 22. Sample: 2 specimens

Form, Chipping Technique, and Dimensions. These were both made from large split pebbles. They measure about 100 mm. long, 62 and 85

mm. wide, 32 and 16 mm. thick. Their ventral surfaces as well as all their edges have been modified by percussion blows.

Geographical and Temporal Relationships. They were found only in the Kluane horizon in the southwest Yukon but are diagnostic of the Cordilleran Tradition in North America (MacNeish 1959a).

Keeled End Scrapers

Fig. 90, Nos. 23 to 25. Sample: 34 specimens

Form and Chipping Technique. These are either ovoid or triangular in outline and all originally were made from thick short prismatic flakes or blades. About half of them show a bulb of percussion near the bases of the concave central surfaces. The cutting edge on the dorsal surface has been formed by steep pressure flaking. The lateral edge as well as lateral surfaces leading to the central ridge also, usually have been modified either by pressure or percussion flaking or both.

Dimensions. Length, 26 to more than 65 mm., average 39 mm.; width, 14-34 mm., average 25.5 mm.; thickness, 7-17 mm., average 12 mm.

Geographical and Temporal Relationships. These are found mainly in the Champagne and Little Arm horizons, although a minority are in the Gladstone and Taye Lake complexes, in the Yukon. They are not common in other cultures in the north although a few from the Pointed Mountain site approach this form (MacNeish 1959). A few are like the boat-shaped scraper of Japan and northeast Siberia (Yoshizaki 1959).

Neatly-Made Plano-Convex End Scrapers

Fig. 90, Nos. 20 and 21. Sample: 14 specimens

Form, Chipping Technique, and Dimensions. Only three of these scrapers are complete and all are ovate in outline (73, 81 and 82 mm. long, 52, 52 and 48 mm. wide, 21, 18 and 18 mm. thick). They are made from large flakes with unworked flat ventral surfaces and all have convex dorsal surfaces with well-controlled pressure flaking radiating toward the edges. The cutting edge is not particularly sharp and slopes at about the same degree as the other parts of the dorsal surface. Superficially they look like turtle shells.

Geographical and Temporal Relationships. They appear in the Little Arm horizon.

Fig. 90. Scrapers. Scale about one-half natural size.

1. Notched scraper (IeSh-1)
2. Notched scraper (JfVb-4/4-3d)
3. Thumbnail scraper (JfVb-4)
4. Thumbnail scraper (KeVd-1)
5. Thumbnail scraper (ShVq-1/44F3-3)
6. Thumbnail scraper (JhUq-2)
7. Flat-topped snub-nosed end scraper (JgVp-1)
8. Flat-topped snub-nosed end scraper (XI-B-102-JhVq-1)
9. Flat-topped snub-nosed end scraper (XI-2-22-JeVc-2)
10. Flat-topped snub-nosed end scraper (XI-B-5)
11. Flat-topped snub-nosed end scraper (XI-B-106-JhVq-1)
12. Flat-topped snub-nosed end scraper (JfVb-4/14-3)
13. Ovoid plano-convex end scraper (XI-B-255)
14. Ovoid plano-convex end scraper (IeSh-1)
15. End-of-the-blade scraper (JgVp-1)
16. End-of-the-blade scraper (JfVb-4/2-3c)
17. End-of-the-blade scraper (JfVb-4/11-1b)
18. Flake end scraper (JeVc-2)
19. Flake end scraper (JfVb-4/4-3d)
20. Neatly chipped plano-convex end scraper (JcUn-1)
21. Neatly chipped plano-convex end scraper (KkVa-2)
22. Scraper plane (JhVq-1/11b3-1)
23. Keeled end scraper (JjVi-2)
24. Keeled end scraper (JjVj-2)
25. Keeled end scraper (LaVk-2/7)


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Flat Flake End Scrapers

Fig. 90, Nos. 18 and 19. Sample: 43 specimens

Form and Chipping Technique. These are all large, flat, and roughly ovoid. They have pressure retouching on the dorsal surface along one of their shorter edges but not on the adjacent edges.

Dimensions. Length, 17-71 mm., average 32 mm.; width, 16-64 mm., average 31 mm.; thickness, 4-15 mm., average 7 mm.

Geographical and Temporal Relationships. These range from the Champagne complex to the Bennett Lake complex and are a general type in the New World.

Chi-Tho Bifaces

Fig. 91, Nos. 5 to 8. Sample: 77 specimens

Form and Chipping Technique. These are oblong, ovoid, or round in outline, quite flat, with rough percussion flaking along their edges. Usually the edges made by the percussion flaking have been dulled by battering or rubbing. They are usually made out of some kind of granular stone, such as sandstone, schist, or the like.

Dimensions. Length, 55-221 mm., average 122 mm.; width, 62-99 mm., average 72 mm.; thickness, 2-11 mm., average 4 mm.

Geographical and Temporal Relationships. These last from Little Arm to Bennett Lake times and occasionally are used today. Although these occur in much of northwest Canada and the western Boreal Forest, in the Neolithic of Siberia and occasionally sites of the Arctic Small Tool Tradition. They appear to be earliest in the southwest Yukon (Tolstoy 1958).

End-of-the-Blade Scrapers

Fig. 90, Nos. 15 to 17. Sample: 37 specimens

Form and Chipping Technique. These are long, triangular to rectangular in outline. They have been made from a large thick prismatic blade. The shorter end opposite the striking platform has steep retouching on its dorsal surface. Eleven have retouching along the lateral edges.

Dimensions. Length, 26-63 mm., average 32 mm.; width, 15-27 mm., average 18 mm.; thickness 3-16 mm., average 7 mm.

Geographical and Temporal Relationships. In southwest Yukon, most of these were found with the Gladstone and Taye Lake complexes, though a few appeared in the Little Arm and Champagne complexes. They also were found in the N.T. Docks (MacNeish 1955), Fisherman's Lake (MacNeish 1954), and Lockhart River complexes (MacNeish 1951) in the Northwest Territories, in the Natulkuz Lake site in British Columbia (Borden 1952), and on the Tyone River (Irving 1957) and Campus sites (Rainey 1939 in Alaska.

Ovoid End Scrapers
Fig. 90, Nos. 13 and 14. Sample: 23 specimens

Form and Chipping Technique. These are plano-convex in cross-section and round to ovoid in outline. Their ventral surfaces are flat, and the dorsal surfaces have a few flake scars on their central portions and steep retouching along three-quarters of their edges.

Dimensions. Diameter, 28-60 mm., average 39 mm.; thickness, 8-15 mm., average 12 mm.

Geographical and Temporal Relationships. These are first found in the Little Arm complex and continue through the Aishihik complex. They are very common throughout the Northwest.

Flat-Topped Snub-Nosed End Scrapers
Fig. 90, Nos. 7 to 12. Sample: 145 specimens

Form and Chipping Technique. These range from oblong to triangular or teardrop-shape in outline and are roughly truncated in cross-section. Their ventral surfaces are flat, and the dorsal surfaces have steep retouching on one shorter edge and adjacent parts on the long edges. The steep retouching leads up to a relatively flat central portion on their dorsal surface.

Dimensions. Length, 21-71 mm., average 36 mm.; width, 15-41 mm., average 30 mm.; thickness, 5-13 mm., average 7 mm.

Geographical and Temporal Relationships. A few of these were found in the Aishihik, Bennett, and Little Arm complexes, but they are most common in the Gladstone and Taye Lake complexes. They are the most common type in the interior of the Northwest.

Crude Plano-Convex End Scrapers
Fig. 91, Nos. 1 to 4. Sample: 33 specimens

Form and Chipping Technique. These are roughly oblong to lenticular in outline and relatively thick being more or less plano-convex in cross-section. The ventral surface is a single flake scar and the dorsal surface bears evidence of percussion flaking. From a quarter to three-quarters of their dorsal edge may bear evidence of pressure flaking or slightly finer percussion flaking.

Dimensions. Length, 50-78 mm., average 66 mm.; width, 22-63 mm., average 44 mm.; thickness, 12-24 mm., average 19 mm.

Geographical and Temporal Relationships. For the most part these occur in the Taye Lake complex though a few occurred in the Gladstone complex. Although they are not a complex type there are none in the Northwest with the exception of a few occurring at Pointed Mountain, N.W.T. (MacNeish 1954) and at Natulkuz, B.C. (Borden 1952).

Fig. 91. End scrapers and chi-thos. Scale about one-half natural size.

1. Crude plano-convex end scraper (JiVs-1/34-3b)
2. Crude plano-convex end scraper (JfVb-4/2-3e)
3. Crude plano-convex end scraper (KfVh-1)
4. Crude plano-convex end scraper (JfVb-4/4-3e)
5. Chi-tho biface (JiVs-1/3-1)
6. Chi-tho biface (JfVf-4)
7. Chi-tho biface (XI-B-148)
8. Chi-tho biface (LaVk-2/2)

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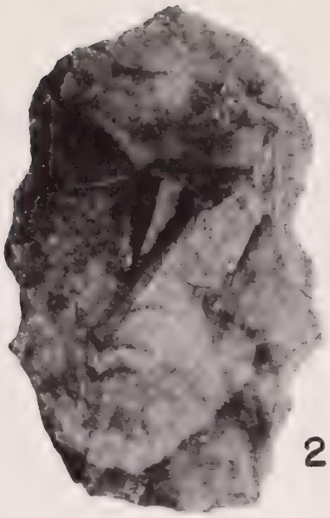

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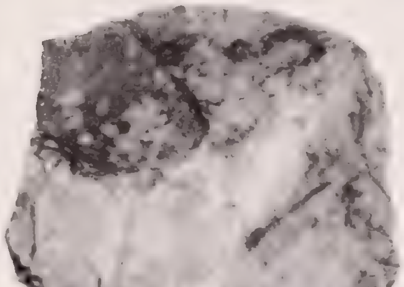

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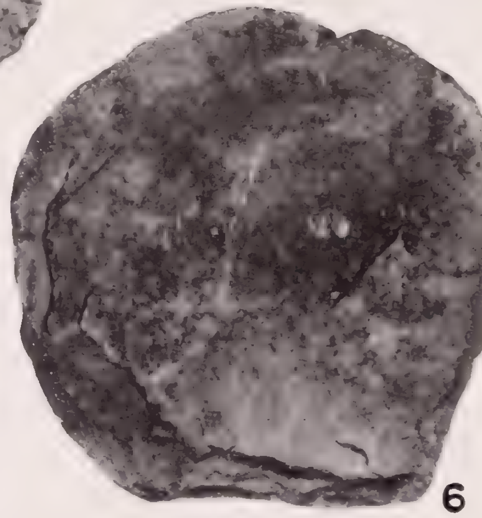

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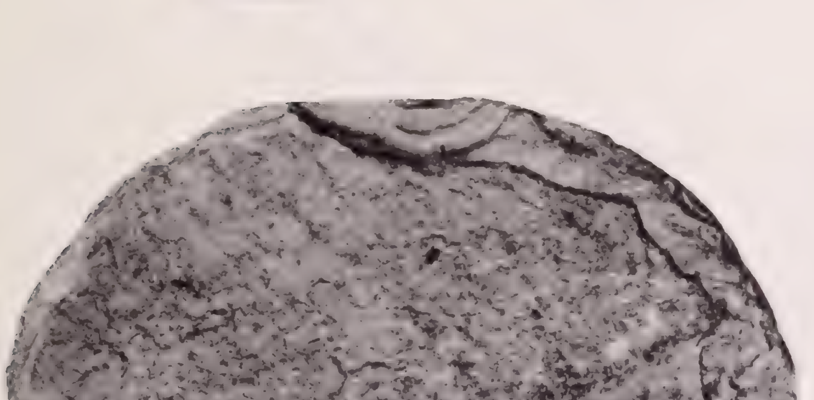

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Table 19

Distribution of Bifaces in Excavated Components

Phase	Excavated Components	Layer or Level	Pebble chopper	Split pebble chopper	Pebble hammer	Ovoid bifacial knife	Biface fragment	Biface chopper	Square base biface	Antler hammer	Half-moon side blade	Small crescentic side blade	TOTAL
Bennett	JbUq-1	Zone A				1	1	2					4
	JfVb-4	Level 1			1		3	4				1	9
	JiVs-1	Levels 1-2		2?			2	4				1	9
	JhVf-4	Zone A			1		1	1					3
Aishihik	JiVs-3	Zone B					1						1
	JhVq-1	Zone C			1		1	1					3
	JhVf-5	Level 2				1	1						2
Taye Lake	JiVs-1	Level 3				1	2	1					4
	JfVb-4	Levels 2-3		3		4	38	68	3		3		119
	IeSh-1	Level 2		1		10	13	50	2		1		77
	KfVd-2	Floor 1	2	9	8	4	4	10	1				38
	JfVg-1	Levels 4-11		2	1	2	6	1		1			13
Gladstone	KfVd-2	Floor 2		2			3						5
	JhVq-1	Zone F3			1	6	13	3	7				30
	JiVs-1	Level 4				1	1	2	2				6
Little Arm	LaVk-2	Zone B		8		1	1	1	1				12
	KkVa-2	Zone B		1?		1	2	4					8
	JiVs-2	Zone F2					2	5					7
	JiVs-1	Level 5		2	1			1					4
	KfVd-2	Floor 3	1	4	5		1	3	1				15
Champagne	KfVe-1	Level 2	1	2									3
	KfVd-2	Floor 4		45	3	1	1	1?					51
	KfVd-2	Floor 5	1	4	4	2							11
Kluane	JhVq-1	Zone C	1	1									2
	TOTAL		6	86	26	35	97	162	17	1	4	2	436

Table 20

Distribution of Bifaces in Surface Components

Phase	Surface Components	Pebble chopper	Split pebble chopper	Pebble hammer	Ovoid bifacial knife	Biface fragment	Biface chopper	Square base biface	Antler hammer	Half-moon side blade	TOTAL
Bennett	JbUq-2						1				1
	JjVi-1	1									1
	JdUi-1							1			1
Aishihik	KeVd-2					2	3				5
Taye Lake	JcVe-1				2	1		1			4
	JfVb-5					2	11				13
	JfVb-1				1	6	5	2			14
	HjRr-1					1					1
	JfVb-7				3	5	26	1			35
	KfVh-1	1									1
	JeVc-2					1	3				4
	JeVc-4					4	6				10
Gladstone	JjVj-5						1				1
	JfVg-3					1	1	1			3
Little Arm	JjVj-2						1				1
	JjVi-2				1	1					2
	JhVh-1					1					1
Champagne	JbUq-6				1						1
	JeVc-3					1	1				2
	JjVj-4					1					1
Unclassified Sites	JfVb-6						1				1
	IwTl-1						1				1
	JfVc-1					2					2
	JhVr-1					1	1				2
	JhUq-1						1				1
	JiUw-1						1				1
	JfVb-2					1					1
	JcUi-1						1				1
	JfVb-5					1					1
	IgSk-1					1					1
	KjTx-2					1					1
	JhVf-8				2						2
	LbVl-1	1									1
	Others						1			1	2
	TOTAL	3			10	34	66	6		1	120

Notched End Scrapers

Fig. 90, Nos. 1 and 2. Sample: 6 specimens

Form and Chipping Technique. Four of these are flat-topped and two have a single dorsal ridge on them. The ventral surfaces of all of them are flat. All have convex cutting edges with a steep face, notched or deeply convex lateral edges, and straight to convex bases. The cutting edges, lateral edges, and notches have been formed by pressure flaking.

Dimensions. Length, 26-36 mm., average 31 mm.; width, 21-40 mm., average 28 mm.; thickness, 6-11 mm., average 8 mm.; depth of notch, 1-4 mm., average 1.3 mm.

Geographical and Temporal Relationships. Notched end scrapers are not common in the North. In the southwest Yukon they are most common in the Taye Lake complex but one appeared in an Aishihik component.

Thumbnail End Scrapers

Fig. 90, Nos. 3 to 6. Sample: 48 specimens

Form and Chipping Technique. These are all made from a thin flake and are small. In outline they range from being teardrop-shaped to being shaped like a thumbnail. Often only the convex cutting edge is retouched and the dorsal surface is not steep. Occasionally adjacent lateral edges are retouched. Most specimens are crudely made.

Dimensions. Length, 17-27mm., average 23 mm.; width, 15-26 mm., average 20 mm,; thickness, 2-7 mm., average 4 mm.

Geographical and Temporal Relationships. These are found in the southwest Yukon associated with the Aishihik and Lake Bennett complexes. The type is common in much of North America particularly in late prehistoric and historic cultural complexes.

Long Antler Flesher

Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. This small fragment (64 by 45 mm.) was made from a piece of flat antler which had been sliced in half and had the end cut off to make a long, flat bar. One end has been beveled and notches cut into the beveled sharpened end. It resembles the long bone fleshers still used by the Yukon Indians.

Geographical and Temporal Relationships. This fragment was discovered in the Lake Bennett level of the Little Arm site.

End Scrapers of European Materials
Sample: 2 specimens

Form, Manufacturing Technique, and Dimensions. One of these scrapers was made from a flat fragment of a gunflint. The other scraper was made from a flat fragment of blue glass. Both are rectangular in outline, measure about 25 by 30 mm., and have steep retouching along one edge.

Geographical and Temporal Relationships. Both were found with Bennett Lake Materials.

Bifacial Choppers, Cores, Knives, Side Blades and Hammers
Tables 19 and 20

Most of these objects were the kind which would be struck percussively against another to break, chip, or cut it and so they have been lumped together for descriptive purposes. All told, 556 were found, 436 of which came from excavations. They reflect cultural changes in an indefinite manner.

Pebble choppers appear to be early, being found in a Kluane Lake and a Champagne component. Split pebble choppers, also, begin as early but continue through Taye Lake times where they are found in diminishing numbers. Bifacial choppers or cores, pebble hammers, biface knife fragments and ovoid bifaces, though absent so far in the Kluane complex, are present throughout the sequence. Square-based knife blades are found in Little Arm, Gladstone, and Taye Lake. Large half-moon side blades and an antler hammer are confined to Taye Lake. Smaller crescentic side blades are found only in Bennett Lake.

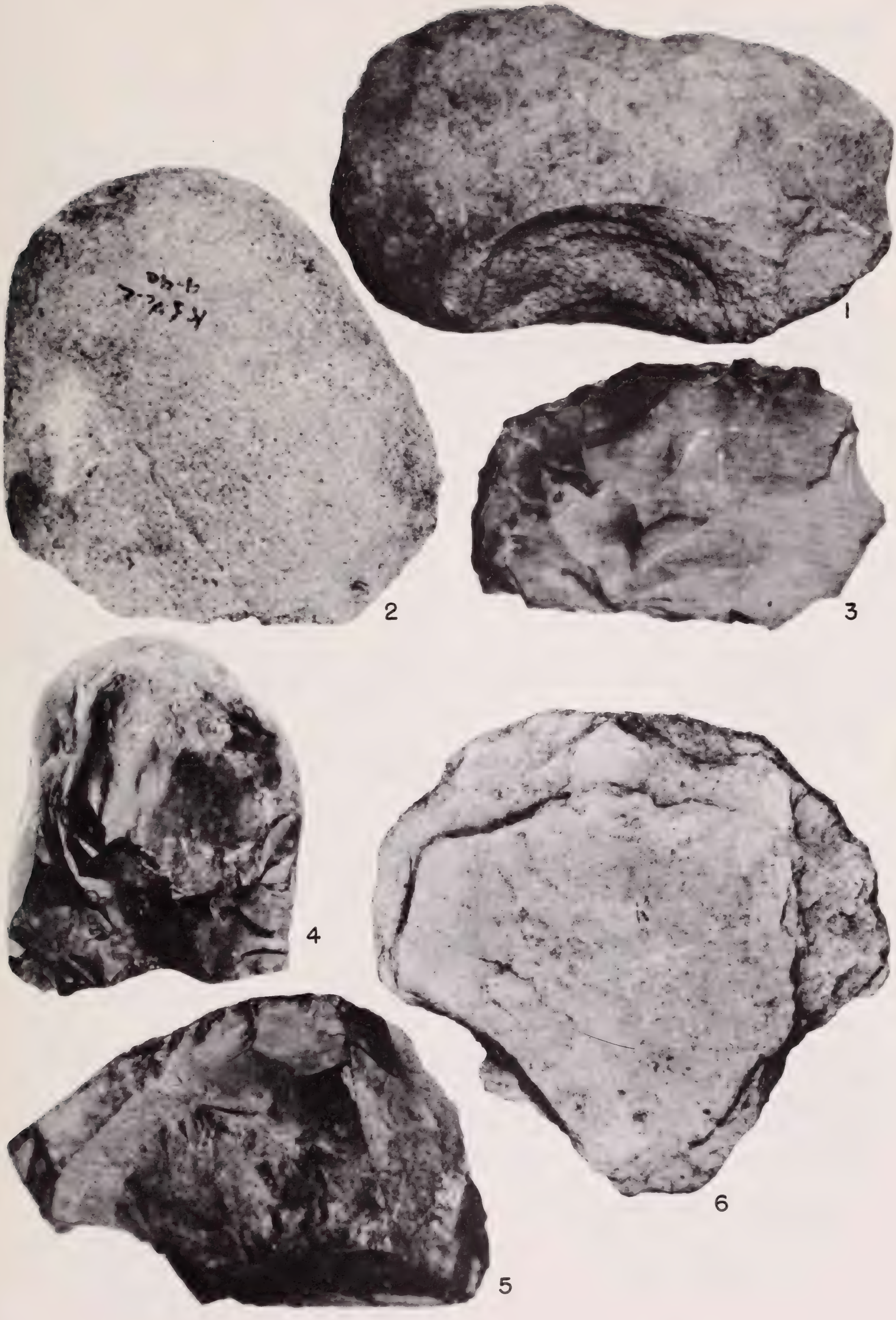
Pebble Choppers
Fig. 92, Nos. 1 and 4. Sample: 9 specimens

Form, Chipping, Technique, and Dimensions. Seven of these were made from elliptical flat pebbles measuring 121 to 176 mm. long, 70 to 121 mm. wide, and 21 to 41 mm. thick (Fig. 92, No. 1). Six of these are chipped on their two longer sides, the earliest one is chipped on one shorter edge and one which looks like a chipped axe has chipping all around it. The other two are made from a spherical pebble (60 mm. wide and 41 thick) which has chopping scars along one chipped end (82 mm. long), (Fig. 92, No. 4).

Geographical and Temporal Relationships. Though our data are far from complete it would appear that pebble choppers are early in our sequence in the southwest Yukon and are not widespread in the northwest.

Fig. 92. Choppers. Scale about one-half natural size.

1. Pebble chopper on a flat pebble (KfVh-1)
2. Chopper made from flake struck from pebble (KfVd-2/3-4e)
3. Bifacially chipped chopper or quarry blank (IeSh-1/7)
4. Pebble chopper on a spherical pebble (LbVl-1)
5. Bifacially chipped chopper or quarry blank (IeSh-1/9)
6. Chopper made from flake struck from pebble (KfVd-2)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Split Pebble Choppers

Fig. 92, Nos. 6 and 2. Sample: 86 specimens

Form and Manufacturing Technique. These are all roughly ovoid in outline and relatively flat. They all were made from a flat flake which has been struck off a pebble. One surface is the inner fractured surface of the pebble while the other portion has the smoother original outside cortex of the pebble. There are usually one to three large percussion flake scars on one end on either or both surfaces. These were caused by the original blows which sheared the initial flake off the pebble. Part of one edge usually has additional small percussion scars, often blunted, due to the use of the flake as a chopper.

Dimensions. Length, 81-172 mm., average 114 mm.; width, 67-122 mm., average 89 mm.; thickness, 11-34 mm., average 21 mm.

Geographical and Temporal Relationships. Though this type of chopper lasted from Kluane through Taye Lake times its greatest popularity seems to be during the Champagne occupation.

Pebble Hammers

Fig. 93, No. 1. Sample: 26 specimens

Form, Chipping Technique, and Dimensions. Hammers are all made from ellipsoidal pebbles between 65 and 148 mm. in length and 35 and 82 mm. in width. Usually one or both ends of the pebbles show pecking, indicating their use as hammers.

Geographical and Temporal Relationships. Very widespread.

Biface Choppers

Fig. 92, Nos. 3 and 5. Sample: 228 specimens

Form and Chipping Technique. These are roughly ovoid in outline though a few are almost teardrop-shaped. The flaking on their two surfaces is almost entirely percussion, while one or more portions of their edges show evidence of battering. Many of these are undoubtedly choppers but some of them may be quarry blanks.

Dimensions. Length, 29-115 mm., average 83 mm.; width, 26-98 mm., average 48 mm.; thickness, 12-38 mm., average 17 mm.

Geographical and Temporal Relationships. In the southwest Yukon these were most popular in the Taye Lake horizon though a few were found in each complex both before and after this period.

Ovoid Bifaces

Fig. 93, Nos. 4, 8, and 9. Sample: 45 specimens

Form and Chipping Technique. These are lenticular, relatively thin, teardrop-shaped or ovoid bifaces which bear percussion flaking on their surfaces and pressure retouching along their edges. Some of these could have been hafted and used as daggers or knives, but some may have been cache blades or quarry blanks.

Dimensions. Length, 50-146 mm., average 84 mm.; width, 33-81 mm., average 46 mm.; thickness, 5-21 mm., average 12 mm.

Geographical and Temporal Relationships. A very general type found throughout much of North America.

Square-Based Bifaces

Fig. 93, No. 7. Sample: 23 specimens

Form and Chipping Technique. These are more or less triangular in outline, their lateral edges being either contracting and straight to a sharp point or roughly parallel and slightly convex leading to an abrupt point. The bases are usually straight and at more or less right angles to the lateral edges. Most of the specimens bear percussion flaking on their surfaces and pressure flaking on their edges. Most of these were probably hafted and used as knives or daggers, one from Gladstone site (JhVq-1) and one from Pelly Farm (KfVd-2), floor 3, having rather dull points and battered and well-retouched squared bases. These may have been used as chipped celts or adzes.

Dimensions. Length, 60-130 mm., average 90 mm.; width, 31-61 mm., average 45 mm.; thickness, 6-16 mm., average 12 mm.

Geographical and Temporal Relationships. This is a widespread type in North America. In the southwest Yukon, however, it is most common in the Gladstone and Taye Lake horizons.

Antler Hammer

Fig. 93, No. 2. Sample: 1 specimen

Form, Chipping Technique and Dimensions. This is a cylindrical object made from antler, 92 mm. long and 46 mm. in diameter. To make the hammer, a basal proximal section of antler about 100 mm. long was sawed from the horn, the exterior was sliced off and the surface ground. While it was being used as a hammer the more rounded end was scarred by pecking.

Geographical and Temporal Range. The tool was found in a Taye Lake stratum.

Fig. 93. Hammers, blades and bifaces. Scale about one-half natural size.

1. Pebble hammer (KfVd-2/4-1e)
2. Antler hammer (JfVg-1/5-4a)
3. Crescentic side blade (JfVb-4/15-1b)
4. Ovoid biface (JhVq-1/58F3-2)
5. Half-moon side blade (SfVb-4/9-3b)
6. Half-moon side blade (XI-B-4)
7. Square-based biface (JhVq-1/4F3-2)
8. Ovoid biface (JhVq-2/4F3-2)
9. Ovoid biface (KfVd-2/2-4)


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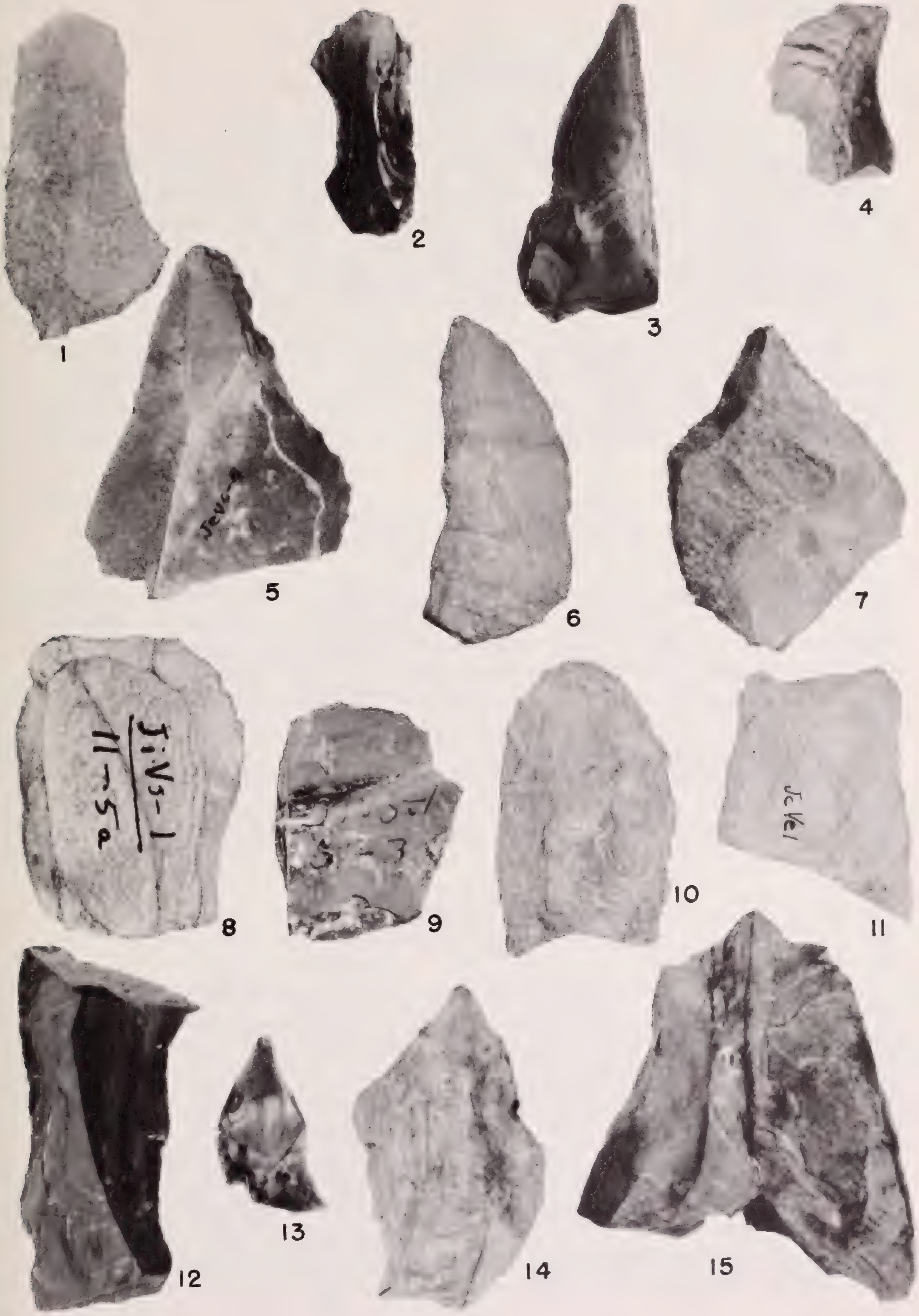
Fig. 94. Uniface sinkers, points and spokeshave-like tools. Scale about one-half natural size.

1. Serrated scraper (JiVs-1/19-5b)
2. Notched scraper or spokeshave-like tool (JhVq-1)
3. Notched scraper or spokeshave-like tool (XI-B-136)
4. Notched scraper or spokeshave-like tool (JiVs-1/41-3b)
5. Uniface retouched to a point (JeVc-4)
6. Uniface retouched to a point (KfVd-1/4-3b)
7. Uniface retouched to a point (XI-B-118)
8. Thin side scraper with two edges retouched (SiVs-1/11-5a)
9. Thin side scraper with two edges retouched (SiVs-1/51-3)
10. Thick double edged side scraper with two edges retouched (XI-B-121)
11. Thick double edged scraper with two edges retouched (JcVe-1)
12. Thin side scraper with one edge retouched (KfVd-2/3-3q)
13. Thin side scraper with one edge retouched (XI-B-222)
14. Thick side scraper with one edge retouched (JfVb-4/4-3h)
15. Thick side scraper with one edge retouched (KlTx-1)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Large Half-Moon Side Blade
Fig. 93, Nos. 5 and 6. Sample: 5 specimens

Form and Chipping Technique. These are all bifacially chipped, thin and half-moon-shaped in outline. Their surfaces bear percussion flaking. The pointed ends and convex edges usually bear finer pressure flaking while the straight edge which is usually somewhat thicker was shaped either by percussion flaking or more poorly controlled pressure flaking.

Dimensions. Length, 64 to more than 120 mm., average 84 mm.; width, 23-44 mm., average 33 mm.; thickness, 9-11 mm., average 10 mm.

Geographical and Temporal Relationships. In the southwest Yukon these are found only in the Taye Lake horizon. This type of tool is not common in the interior forest area of the Northwest though it does occur in many horizons in the Arctic drainage from 3000 B.C. to historic times.

Small Crescentic Side Blades
Fig. 93, No. 3. Sample: 2 specimens

Form, Chipping Technique, and Dimensions. Both of these are semilunar in outline and made from a flake. One surface exhibits percussion flaking scars, the convex edge is retouched and may actually represent a prepared striking platform, and the concave edge has fine bifacial retouching. Both are short (30 mm.), wide (20 mm.), thin (4 mm.), and the curve of the concave edges reach a maximum depth of less than 2 mm. below a straight line from the two ends.

Geographical and Temporal Relationships. These are found only with Bennett Lake remains. They are not found elsewhere in the north although some of the side blades with Arctic cultures are vaguely similar.

Other Chipped Unifacial Tools
See Tables 21 and 22

Unifacial tools are those which have one or more of their longer edges retouched or chipped by use. In archaeological horizons they are often referred to as side scrapers. 754 were uncovered in our excavations. These are included with the 232 from our surface collections in this study. The majority of them are extremely general and they appear throughout our sequence. They fall into two categories. One has two types, i.e., thin flake side scrapers with one edge retouched or worked and thick unifacial side scrapers with one edge steeply retouched or worked. A second group comprises thin and thick flake side scrapers with non-adjacent retouched edges. These have a different distribution from the former because they do not appear in our earliest complex, i.e., Kluane. Whether these tools are actually types or not is open to

Table 21

Distribution of Unifaces in Excavated Components

Phase	Excavated Components	Level or Layer	Thin flake side scraper—1 edge retouched	Thick flake side scraper—1 edge retouched	Thin flake side scraper—2 edges retouched	Thick flake side scraper—2 edges retouched	Thin flake side scraper—1 edge serrated	Thin flake side scraper—retouched to a point	Spokeshave-like or notched scraper	TOTAL
Bennett	JbUq-1	Zone A	2		1					3
	JfVb-4	Level 1	13	5	3					21
	JiVs-1	Levels 1-2	12	1	3			1		17
	JhVf-4	Zone A	17	1	2	1				21
Aishihik	JiVs-3	Zone B	1							1
	JhVq-1	Zone C	2							2
	JhVf-5	Level 2	2	1						3
	JfVg-1	Levels 1-3	8	1	2					11
Taye Lake	JiVs-5	Zone E	3	1						4
	JiVs-1	Level 3	13	1	1				1	16
	JfVb-4	Levels 2-3	78	54	9	8		9	1	159
	IeSh-1	Level 2	72	26	15	8		2	2	125
	KfVd-2	Floor 1	29	9	4	2		1	3	48
	JfVg-1	Levels 4-11	21	2	2	?			1	26
Gladstone	JgVp-1	Zone F	5		2				1	8
	KfVd-2	Floor 2	4		1			1		6
	JhVq-1	Zone F3	61	13	18	5		3	6	106
	JiVs-1	Level 4	4		1				1?	6
Little Arm	LaVk-2	Zone B	29	4	5	1	2	1	1	43
	KkVa-2	Zone B	5	1	2			2		10
	JiVs-2	Zone F2	6	3	3					12
	JiVs-1	Level 5	7		1		2	1		11
	KfVd-2	Floor 3	10	3	1	2	1	4		21
Champagne	KfVe-1	Level 2		1						1
	KfVd-2	Floor 4	35	5	5	1				46
	KfVd-2	Floor 5	18	3						21
Kluane	JhVq-1	Zone G	3	3						6
	TOTALS		460	138	81	28	5	25	17	754

Table 22

Distribution of Unifaces in Surface Components

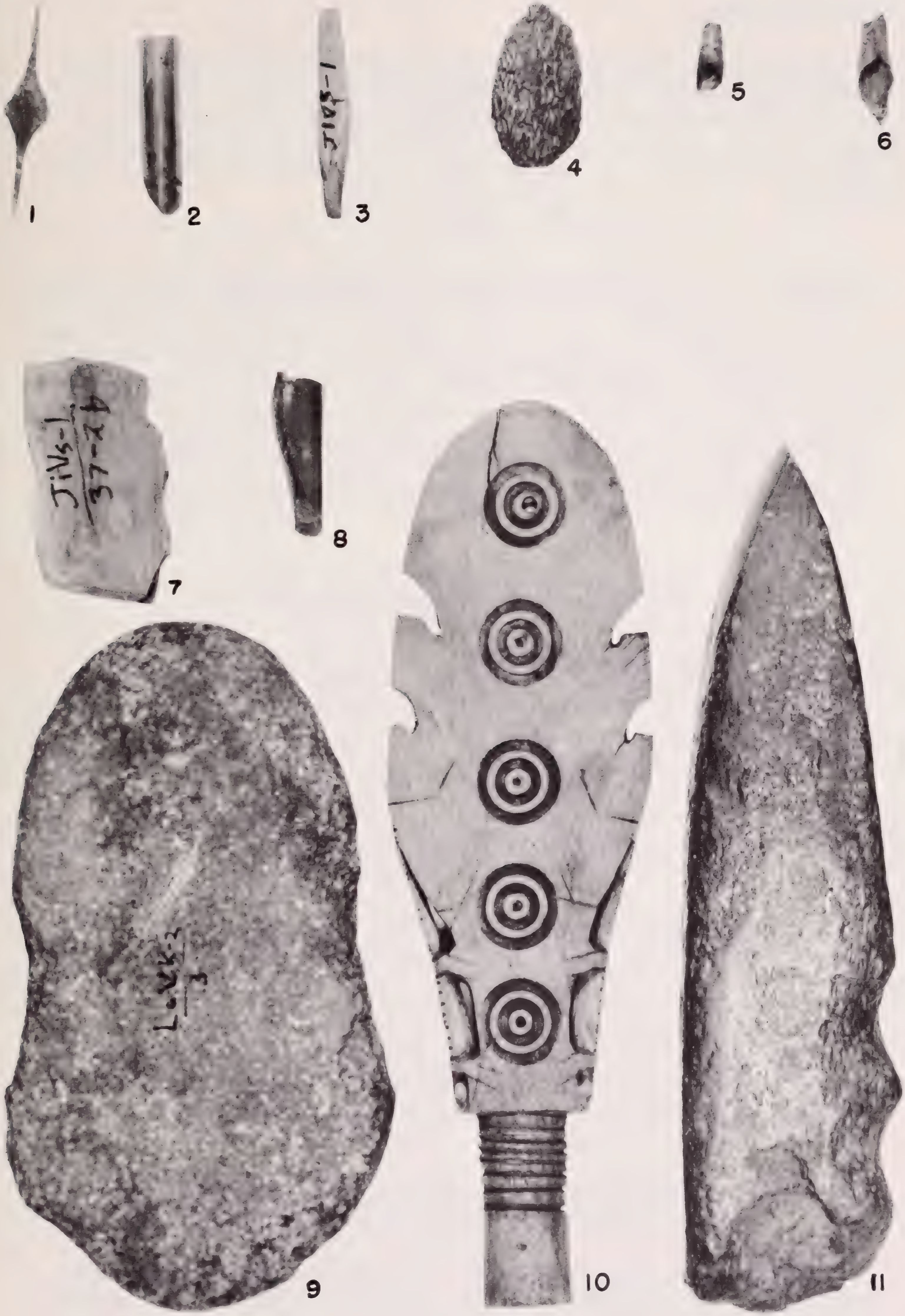
Phase	Surface Components	Thin flake side scraper— 1 edge retouched	Thick flake side scraper— 1 edge retouched	Thin flake side scraper— 2 edges retouched	Thick flake side scraper— 2 edges retouched	Thin flake side scraper— 1 edge serrated	Thin flake side scraper— retouched to a point	Spokeshave-like or notched scraper	TOTAL
Bennett	JbUq-2	......	......	1	......	......	......	......	1
	JhVf-9	1	......	......	......	......	......	......	1
	KeVd-1	1	......	......	......	......	......	......	1
	JjVi-1	1	......	......	......	......	......	......	1
	JkUs-1	1	......	......	......	......	......	......	1
	JhVf-3	1	......	......	......	......	......	......	1
	JdUi-1	1	......	......	......	......	1	......	2
Aishihik	KeVd-2	5	......	......	......	......	......	......	5
	JjVi-3	......	......	......	1	......	1	......	2
	JbUr-1	1	......	......	......	......	......	......	1
Taye Lake	KbVa-1	1	......	2	......	......	......	......	3
	JeVc-6	1	......	......	......	......	......	......	1
	JcVe-1	2	1	1	1	......	......	......	5
	JfVb-5	3	8	2	1	......	......	1	15
	JfVb-1	2	4	2	......	......	......	......	8
	HjRr-1	1	......	1	......	......	......	......	2
	JfVb-7	5	3	3	2	......	......	......	13
	KiVc-1	2	1	......	......	......	......	......	3
	KfVh-1	1	......	......	......	......	......	......	1
	JeVc-2	8	2	6	1	......	......	1	18
	JeVc-4	12	2	4	1	......	1	3	23
Gladstone	JjVj-5	3	......	......	......	......	......	......	3
	JjVj-3	......	1	......	......	......	......	......	1
	JfVg-3	4	4	1	2	......	......	......	11
	JeVc-1	2	1	......	......	......	......	......	3
Little Arm	JjVj-2	1	......	......	......	......	......	......	1
	JeVc-5	5	2	6	......	......	......	......	13
	JiVg-1	......	......	1	......	......	......	......	1
	JjVi-2	2	......	......	......	......	......	1	3
	JeVi-1	5	......	1	......	......	......	......	6
	KjTx-1	1	......	......	......	......	......	......	1
	JhVh-1	3	......	......	......	......	......	......	3
	Subtotal	76	29	39	9	0	3	6	176

Table 22 (continued)

Phase	Surface Components	Thin flake side scraper—1 edge retouched	Thick flake side scraper—1 edge retouched	Thin flake side scraper—2 edges retouched	Thick flake side scraper—2 edges retouched	Thin flake side scraper—1 edge serrated	Thin flake side scraper—retouched to a point	Spokeshave-like or notched scraper	TOTALS
Champagne	KjTx-3	1	......	......	......	......	......	......	1
	JfVg-2	......	......	......	......	......	......	......	1
	JgVd-1	2	......	......	......	......	......	......	2
	JbUq-6	1	......	1	......	......	......	......	2
	JeVc-3	4	......	2	......	......	......	......	6
	JiVs-4	1	......	......	......	......	......	......	1
	JhVf-6	1	......	......	......	......	......	......	1
	JfVc-2	......	......	2	......	......	......	......	2
	JjVj-4	1	......	......	......	......	......	......	1
	JbUq-4	2	......	2	1	......	......	......	5
Unclassified Sites	JfVb-6	......	......	......	......	......	......	1	1
	JfVb-3	1	3	1	......	......	......	1	6
	JdUp-1	1	......	......	......	......	......	......	1
	JcUi-1	1	......	......	......	......	......	......	1
	KeVh-1	2	......	......	......	......	......	......	2
	JhVf-7	1	......	......	......	......	......	......	1
	JfUm-1	2	......	......	......	......	......	......	2
	JfVc-1	1	2	1	......	......	......	......	4
	JgVp-1	11	2	4	......	......	......	......	17
	JhVr-1	1	......	......	......	......	......	......	1
	JhUu-1	......	1	......	......	......	......	......	1
	JiUw-1	1	......	......	......	......	......	......	1
	KjTx-2	1	......	1	......	......	......	......	2
	LbVl-1	2	......	......	......	......	......	......	2
	KkTx-1	1	......	......	......	......	......	......	1
	KbVo-1	2	......	......	......	......	......	......	2
	JkVx-1	1	......	......	......	......	......	......	1
	LaVk-1	1	......	......	......	......	......	......	1
	LaTw-1	1	......	......	......	......	......	......	1
	JbUq-3	1	......	......	......	......	......	......	1
	KeVd-4	1	......	......	......	......	......	......	1
	KlTx-1	......	1	......	......	......	......	......	1
	LdTu-1	1	......	......	......	......	......	......	1
	JiVg-1	......	......	1	......	......	......	......	1
	JfVc-3	......	1	......	......	......	......	......	1
	Subtotals	47	11	8	1	0	0	2	54
	TOTALS	123	40	46	10	0	3	8	230

Fig. 95. Miscellaneous Artifacts. Scale about one-half natural size.

1. Copper fish gorge (JhVf-4/3-3)
2. Bone tube (JiVs-1/23-2b)
3. Antler fish gorge (JiVs-1/6-2b)
4. Ovoid cut bone (JiVs-1/43-2b)
5. Copper tinkler (JiVs-1/15-2b)
6. Copper tinkler (JiVs-1/52-2b)
7. Abrading stone (JiVs-1/32-2b)
8. Abrading stone (JiVs-1/32-2b)
9. Net sinker (LaVk-2/3)
10. Carved paddle-like object (KeVd-1)
11. Three-quarter grooved adze (XI-B-1)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question. Three other groups of tools, however, do have sufficiently distinctive temporal distribution to justify their being called types. Serrated unifaces occur only in the Little Arm complex. Pointed unifaces occur only in the three microblade phases, as do spokeshave-like tools. The latter appears to be more frequent in the Gladstone and Taye Lake horizons.

Thin Single-Edge Flake Side Scrapers
Fig. 94, Nos. 12 and 13. Sample: 583 specimens

Form and Chipping Techniques. These are flat flakes having retouching or flake scars along the longer edge and on one surface. These scars are the result of use.

Dimensions. Length, 11-68 mm., average 52 mm.; width, 41-55 mm., average 30 mm.; thickness, 1-10 mm., average 6 mm.

Geographical and Temporal Relationships. Very widespread.

Thick Double-Edged Flake Side Scraper
Fig. 94, 10, 11. Sample: 40 specimens

Form and Chipping Technique. These are large, thick irregular flakes retouched on one surface on opposite edges.

Dimensions. Length, 34-96 mm., average 68 mm.; width, 19-72 mm., average 43 mm.; thickness, 4-42 mm., average 17 mm.

Geographical and Temporal Relationships. Very widespread.

Thick Single-Edge Side Scrapers
Fig. 94, Nos. 14 and 15. Sample: 178 specimens

Form and Chipping Technique. These are made from thick flakes having one flat side. The other side bears a few rough flake scars. One edge of the surface bearing the numerous flake scars is retouched. Some of the sharpening of the edge was done by percussion. Both kinds of retouching are usually steep.

Dimensions. Length, 44-82 mm., average 64 mm.; width, 19-57 mm., average 50 mm.; thickness, 9-38 mm., average 16 mm.

Geographical and Temporal Relationships. Very widespread.

Thin Double-Edge Flake Side Scrapers
Fig. 94, Nos. 8 and 9. Sample: 127 specimens

Form and Chipping Technique. These are irregular-shaped thin flakes. Two non-adjacent edges on the dorsal surfaces exhibit scars from retouching or use.

Dimensions. Length, 12-53 mm., average 41 mm.; width, 10-55 mm., average 31 mm.; thickness, 2-12 mm., average 6 mm.

Geographical and Temporal Relationships. Very widespread.

Serrated Thin Flakes

Fig. 94, No. 1. Sample: 5 specimens

Form and Chipping Technique. All of these flakes are elongated in outline, plano-convex in cross-section, and made from basalt. Three are made from flat irregular flakes and two are made from flint prismatic flakes or crude blades. Three have deep retouching along one edge and two have similar retouching on two opposite edges. This gives them a serrated or saw-like cutting edge.

Dimensions. Length, 59-73 mm., average 64 mm.; width, 28-46 mm., average 33 mm.; thickness, 7-10 mm., average 8 mm.

Geographical and Temporal Relationships. These are confined to the Little Arm horizon.

Unifaces Retouched to a Point

Fig. 94, Nos. 5, 6, 7. Sample: 28 specimens

Form and Chipping Technique. These unifaces vary from 4-43 mm. in thickness, from 11-138 mm. in length, and in width from 9-71 mm. They have one single feature in common. Two adjacent dorsal edges have been retouched to form a gradual point. Whether they were scrapers, drills, knives, or projectile points cannot be determined.

Geographical and Temporal Relationships. In the Yukon they appear in the microblade horizons. I do not know their distribution in surrounding regions.

Notched Side Scrapers or Spokeshave-Like Tools

Fig. 94, Nos. 2, 3, 4. Sample: 25 specimens

Form, Chipping Technique, and Dimensions. The size and dimensions of the unifaces are much like the side scrapers retouched along one edge. They are, however, different in that the retouched edge is convex. This convexity varies from being shallow 1 to 4 mm. deep and 10 to 43 mm. long to very definitely notched 3 to 15 mm. deep and 8 to 21 mm. wide.

Geographical and Temporal Relationships. In the southwest Yukon these are mainly in the Gladstone and Taye Lake horizons.

Miscellaneous Artifacts
Table 23

Net Sinkers

Fig. 95, No. 9. Sample: 9 specimens

Form and Manufacturing Technique. These are flat elongated pebbles which have been notched along their longer lateral edges. The notching has been made by percussion, by striking their edges a number of times. One from Gladstone and one from Taye Lake have percussion blows on their ends, so they might also have served as hafted axes or adzes.

Dimensions. Length, 82-161 mm., average 135 mm.; width, 51-121 mm., average 70 mm.; thickness, 14-36 mm., average 24 mm.

Geographical and Temporal Relationships. In the Yukon these ranged from Little Arm to Bennett Lake times. This type of artifact is widespread in North America and eastern Siberia. If, however, the Little Arm complex is as old as 5000 B.C. then the earlier Yukon specimens precede those occurring in other regions. Also, if all these net sinkers are connected with the use of gill nets then it is possible that the center of origin of the gill net lake fishing technique is in the interior of the Yukon. The type with the worked ends are also found in the Tuktu complex in the Brooks Range (Campbell 1961a).

Abraders

Fig. 95, Nos. 7 and 8. Sample: 3 specimens

Form, Manufacturing Technique and Dimensions. All of these are made from small, ovoid flat pebbles or sandstone or shale. They range in size from 30 to over 120 mm. in length, from 10 to 55 mm. in width, and are about 15 mm. thick. One edge shows the effects of having been used for abrading or polishing.

Geographical and Temporal Relationships. They range from Gladstone to Bennett Lake times.

Three-Quarter Grooved Adzes

Fig. 95, No. 11. Sample: 5 specimens

Form and Manufacturing Technique. These adzes are roughly rectangular in outline and plano-convex in cross-section. They are made from a hard sandstone and have been ground into shape. One or two grooves have been ground into all but their flat surface.

Dimensions. Length, 131-178 mm., average 157 mm.; width, 38-68 mm., average 61 mm.; thickness, 24-50 mm., average 47 mm.

Geographical and Temporal Relationships. They range from Taye

Table 23

Distribution of Miscellaneous Artifacts in Excavated and Surface Components

Phase	Excavated Components	Surface Components	Layer or Level	Net sinker	Abrader	¾ grooved adze	Ground slate	Bone tube	Corded paddle	Antler gorge	Copper tinkler	Copper gorge	TOTALS
Bennett	JbUq-1		Zone 1-2									1	1
	JiVs-1		Level 1	1	2			1		1	2	1	8
	JhVf-4		Zone A			1	1						2
		JbUq-2	Surface			1							1
		KeVd-1	Surface						1				1
		JjVi-1	Surface				1	1					2
Aishihik	JiVs-3		Zone B			1							1
	JfVg-1		Level 1-3	1									1
		JaUe-1	Surface			1							1
Taye Lake	JfVg-1		Level 4-11	2									2
		KbVa-1	Surface			1							1
Gladstone	JhVq-1		Zone F3	1									1
		JfVg-3	Surface		1								1
Little Arm	LaVk-2		Zone B	1									1
	JiVs-1		Level 5	1									1
	JjVi-4			2									2
	Other Sites					1							1
	TOTAL			9	3	5	2	3	1	1	2	2	28

Lake to Bennett Lake times in the southwest Yukon. Similar ones occur on the Northwest Coast and in eastern Asia.

Ground Slate
Sample: 2 specimens

Form, Manufacturing Technique and Dimensions. Two small fragments of ground slate were found. They are both about 10 mm. thick. Both are too small to indicate their original form or function.

Geographical and Temporal Relationships. They were found in Bennett Lake components.

Bone Tubes
Fig. 95, No. 2. Sample: 3 specimens

Form, Manufacturing Technique, and Dimensions. These fragments are tubes made from bird leg bones which have been sawed to their desired lengths and then polished. The longest was over 60 mm. in length and all are about 10 to 20 mm. in diameter. All could have served as beads, but one is much more polished at one end than the other, suggesting it might have been a shaman's sucking tube.

Geographical and Temporal Relationships. They are found in the Bennett Lake phase.

Antler Paddle-Like Tool
Fig. 95, No. 10. Sample: 1 specimen

Form and Manufacturing Technique. This is made of a flat piece of antler in the general form of a short paddle. The blade-like section of the paddle bears five sets of concentric circles in a line down its middle. These were evidently made by some compass-like cutting tool. The two lateral edges of the paddle bear two V-shaped notches in them. At the junction of the blade and the shaft of the paddle on the two lateral edges are two carved lizard-like animals with their tails running out along the edge of the paddle blade. The shaft of the paddle is circular in cross section and is encircled by nine carved parallel grooves.

Dimensions. Length, 154 mm.; width, 47 mm.; thickness, 15 mm.

Geographical and Temporal Relationships. Unknown.

Antler Gorge

Fig. 95, No. 3. Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. This gorge, cut out of a sliver of antler, is rectangular in cross-section, long (50 mm. by 8 mm. by 5 mm. thick), and its two ends have been polished to points. It has a groove in the middle.

Copper Gorge

Fig. 95, No. 1. Sample: 1 specimen

Form, Manufacturing Technique, and Dimensions. The whole copper fish gorge was beaten cold from native Yukon copper. It is 49 mm. long and its two ends are pointed. These are rectangular in cross-section having a maximum thickness of about 4 mm. The center portion of the gorge has been beaten into a flat wafer-like section which is roughly circular, being about 11 mm. in diameter.

Geographical and Temporal Relationships. I know of no similar objects appearing in Bennett Lake times. Similar ones, however, do appear in the Old Copper culture of the Great Lakes area at a much earlier date (G. Quimby, personal communication).

Copper Tinklers

Fig. 95, Nos. 5 and 6. Sample: 2 specimens

Form and Manufacturing Technique. These are made of native copper which has been beaten into a small, flat piece and then rolled into a small cone.

Dimensions. Length, 15 and 25 mm.; diameter, 7 and 9 mm.

APPENDIX II

Settlement Pattern

In the survey one hundred and twenty-seven archaeological components were recorded. Of these, eighty-six can be classified into five cultural phases and two cultural complexes. Upon the completion of the survey and culture classification of the sites an attempt was made to determine if there were changes in settlement pattern. After considerable study of our material from a number of different points of view, three factors seemed important in reconstructing culture types. The first was size of the site. At no site which we excavated was there thick refuse or evidence of long, that is, more than seasonal occupation. With the time factor thus removed from a consideration of the characteristics of sites, we assumed that the spatial extent of the human remains (chips, artifacts, bone, and firecracked rock) reflected the actual size of the social group living together at one moment in time. Sites with refuse distributed over an area less than twenty-five hundred feet square and having fewer than two fireplaces were considered to be small. We interpreted such sites as having been laid down by a microband (MacNeish 1958), that is, by groups comprised of less than 3 biological families. Sites having from three to ten hearths and areas of refuse covering more than twenty-five hundred but less than one hundred and sixty thousand square feet were considered to be medium in size. The inference here was that the social group was some kind of macroband. It is, of course, entirely possible that a microband occupied adjacent parts of the same site repeatedly during a number of seasons so close together in time that it would appear their refuse belonged to the same time period. This may be true of some sites classified as medium. At Minto Lake (KkVa-2), Little Arm site (JiVs-1) level 5, and JiVs-1 Level 4, and at the Gladstone site (JhVq-1) zone F3, however, fragments of artifacts or bones found at very different parts of the site fitted together. This indicates that the different parts of the site were occupied during a single season and suggests that this is true of other sites classified as medium-sized. Three other sites were larger than any of the others and were classified as large. Each of these was either occupied by very large macrobands or they represent spots to which the medium-sized macrobands had returned repeatedly. If it is the latter then it may be inferred that these people had some concept of territoriality. Regardless of these considerations, the sites have been placed in a special category.

The second factor involved in classifying these sites was their geographic location. Geographic location often reflects the subsistence pattern. Sites located in mountain passes are obviously located on game trails and thus are hunting camps. It must be noted, however, that sites along lakes were not necessarily fishing camps, for their topography is

Table 24

Distribution of Eighty-Six Archaeological Sites by Characteristics Localities and Estimates of the Subsistence Patterns of the Occupants

Archaeological Complex	Small Site on High Terrace of a Lake 1	Small Site on High Terrace of a Stream or River 2	Medium Sized Site on High Terrace of a Stream or River 3	Small Site at Edge of a Lake 4	Small Site on Ridge or Mountain Pass 5	Medium Sized Site at the Edge of a Lake 6
Bennett Lake 13 Components				JhVf-9		JjVi-1 JfVb-4 JbUq-2 JbUq-5 JiVs-1
Aishihik 10 Components	JhVq-1 Zone C	JhVf-3 JfVg-1 Level 1 JfVg-1 Level 2 JfVg-1 Level 3				JbUr-1 JjVi-3 JiVs-3 JaUe-1
Taye Lake 24 Components		JfVg-1 Levels 4 to10	KiVc-1 JfVb-1 HjRr-1 KfVd-2 Floor 1	JiVs-1	JeVc-4	JiVs-5 JcUj-1 KkVa-1 JfVb-1
Gladstone 12 Components	JhVq-2	JfVg-1 Level 11 JhVf-1 KfVd-2 Floor 2 JgVp-1			JeVc-1	JjVi-5 JjVj-5 JiVs-1
Little Arm 13 Components		KjTx-1 KeVd-3	LaVk-2 KfVd-2 Floor 3	KaVa-1 JjVi-2 JhVh-1	JeVc-5	JjVj-2 JeVi-1 KkVa-2 JiVs-1 JiVs-2
Champagne 13 Components	JiVs-4	JiVj-4 KfVe-1 JhVf-6 JfVg-1 JeVc-3 KjTx-3 KfVd-2 Floor 5	KfVd-2 Floor 4	JbUq-4 JbUq-6 JgVd-1	JfVc-2	
Kluane 1 Component	JhVq-1 Zone G					

Medium Sized Site on High Terrace of a Lake 7	Large Site at Edge of Lake 8	Medium Sized Site on Bank of Stream 9	Medium Sized Site on Bank of River 10	Relative Size			Possible Subsistence Pattern		
				small	medium	large	Predominately Hunting Camp (Column nos. 1,2,3,5,7)	Predominately Lake Fishing or Trapping Camp (Column nos. 4,6,8)	Predominately River Fishing or Trapping Camp (Column nos. 9,10)
JbUq-1		JhVf-4 JhVf-3	JkUs-1 JdUi-1 KfVd-3 KeVd-1	1	12		1	6	6
			KeVd-2	5	5		5	4	1
KbVa-1	JfVb-5 JfVb-4 IeSh-1	JcVe-1 JfVb-6 JeVc-6		9	12	3	13	8	3
JjVj-3 JhVq-1		JfVg-3		6	6		8	3	1
				6	7		5	8	
				12	1		10	3	
				1			1		

important. For example, the west end of the Gladstone site (JhVq-1) is horizontally only about 100 feet from Kluane Lake but vertically about 150 feet above it and on a game trail which runs along the highest terrace. This lake site was not a fishing camp but a hunting one. Therefore, geographical location and topography are factors in the classification of sites according to settlement pattern.

Table 24 classifies all the sites by means of ten categories defined by the size of the site and the geography and topography of its location. The table also shows significant changes through time. Perhaps more important than the changes themselves are the inferences about community patterning which can be made from the raw data. All sites but one from the Champagne phase are small in size, all were used for a short time, and all are in positions from which large game could be hunted. The large occupation at the Pelly Farm site (KfVd-2) is also on a game trail, but it may be that the butchering of a bison herd had attracted other microbands to this locality. I believe that the sites at Champagne, and probably at Kluane Lake, reflect a community pattern characterized by nomadic microbands who were big game hunters. Three sites along the lake indicate that what fishing was done was relatively unimportant. The sites of Little Arm, Gladstone, and Taye Lake are those of seasonal macro- and microbands -- that is, groups which perhaps hunt as microbands in the winter but coalesce into macrobands during the summer to hunt, trap and fish around lakes.

The final community pattern characteristic of perhaps the Aishihik and Bennett Lake complexes is similar to the latter in having macrobands. However, they are fairly permanent macrobands, hunting and trapping and perhaps ice fishing, along the lakes in winter and salmon fishing along the rivers in the summer, with only very occasional hunting trips by microbands.

APPENDIX III

The Osteological Remains

Of the 1, 000 or more fragments of bone found in our excavation, about 250 from at least 131 different animals were identifiable. The identification of these bones was a cooperative venture. First, Mr. J. A. Dellaire of the National Museum of Canada and I laid them out on a large table by site and level. Next, Dr. W. Langston, then of the National Museum of Canada and now with the Texas Memorial Museum, indicated which bones were not identifiable by comparison with the National Museum's limited osteological collections. Most of the remainder of the bones were classified by order and sub-order, and a few by genus. Then, Dr. Langston, with Dr. A. W. F. Banfield and Dr. P. M. Youngman of the National Museum of Canada, identified the mammal and its anatomical part represented by each bone. Eventually, identification by species was accomplished. About fifty bones were eliminated because we could not identify them. There remained unidentified only the fish and bird bones. Mr. S. D. MacDonald of the National Museum of Canada identified some of the bird bones and was able to indicate which among the unidentified bones were winter fowl and which were summer fowl. The fish bones were not identified by species. To these scientists mentioned above I extend my thanks.

Using these identifications I constructed Table 25 which compares identification with archaeological provenience. As is perhaps apparent, few if any components have large samples of identified bones. This, of course, limits interpretations of the cultural and geological significance of these remains. A number of other kinds of studies of the bones such as the age and sex of each animal, its prowling habits, etc., should be undertaken for a better understanding of their cultural significance. This sort of study, unfortunately, was not possible.

A study of the animal bones from the excavations theoretically sheds light on a number of different phenomena. Ideally, it would tell something about the population size and length of stay of each occupation or component. It does, of course, shed some light on the subsistence pattern of the people and includes information concerning their subsistence activities and their butchering techniques. Certain of the bones uncovered, such as those of seasonal animals, can give some idea concerning the season or seasons during which the occupations took place. Lastly, the various kinds of animals killed reflect the climatic and vegetational periods of the various archaeological phases or complexes.

Unfortunately, in no level or occupation was a large sample of bones preserved, nor were the bones distributed throughout all the refuse of any one occupation. Thus our meager sample tells us little about population size other than to suggest that it was usually small and probably of short

duration. In fact, only the somewhat larger sample of bones from at least 7 of big game animals in Floor 4 of the Pelly Farm site suggests that here there may have been a fair number of people. In actual fact the size of the area covered by refuse is probably a better indication of group size than the food remains.

The limited sample of bones does, however, give some idea of shifts in the subsistence activities. The predominance of big game animals in Champagne and Little Arm certainly show these people were mainly hunters. The somewhat increased number of small game animals and the lesser number of big game animals in Gladstone and Taye Lake may indicate that trapping was as important as hunting. The fish bones, the bones of many small mammals, and the few moose bones in Bennett Lake seem to show that these people were fishermen and trappers and only incidentally big game hunters. These indications of subsistence activities taken in conjunction with certain tool types allow one to estimate the character of the subsistence pattern during each occupation.

The techniques for the preparation of the food are much the same throughout the sequence. In all horizons bones seem to have been split and scraped for marrow, and burned bones seem to indicate that some meat was roasted over fires filled with hot stones. There are, however, from Gladstone times on, increasing amounts of badly smashed, burned and ground bone, suggesting that in later times some of the meat was perhaps boiled into a kind of stew. Small animals appear to have been brought home whole, except for the skulls and butchered and skinned in camp. Big game animals were, however, treated rather differently. At all periods they were killed away from the camp and their skulls left with the kill or eaten on the spot. During most periods the limb bones, rib cases and the jaws with their juicy tongues seem to have been cut from the kill and taken into camp. However, in Champagne times we find shoulder blades and pieces of pelvis, indicating that shoulders and hindquarters including the bones were also dragged back to camp. Perhaps at later times the meat was cut away from the bones in these parts and only the meat brought back to camp. Bird bones, while appearing in all phases, only show evidence of burning or cooking in the Bennett Lake horizon. Perhaps in earlier periods they were eaten raw.

Though our sample is usually rather small a study of the bones reveals some information concerning the time of the year sites were occupied. Since bird meat does not preserve well in the summer months and since some birds are migratory, the presence of bones of summer or spring fowl indicates summer residence. Site JbUq-1, Level 1 of Canyon Creek Rapids (JfVb-4), Levels 1, 2, 3, 4, and 10 of Canyon Creek site (JfVg-1), Floors 1 and 4 of Pelly Farm site (KfVd-2), Levels 1, 3, 4, and 5 of Little Arm site (JiVs-1), and Zone F of Gladstone site (JhVq-1), all have bones of summer fowl and were, therefore, occupied during the summer. Some animals in the north shed their antlers in the summer, but carry them in the winter. It has been assumed that occupations including caribou antler, goat or sheep horn but lacking bird bone may have

Table 25

Distribution of Estimated Number of Individual Animals in the Excavated Sites Arranged by Culture Complex

Complex	Site	Level	Ovibos (Muskox)	Cervus (Elk)	Bison (Buffalo)	Artiodactyl (small species)	Rangifer (Caribou)	Castor (Beaver)	Erethizon dorsatum (porcupine)	Canis (Wolf?)	Alces (moose)	Ursus (Black Bear)	Rodentia	Capra or Ovis (Goat or Sheep)	Lepus (rabbit)	Small Carnivora (Vulpes sp.?)	Aves (unclassified)	Tansus sp.?	Nyrocinae sp.? (surface scooper duck)	Tetraonidae sp.? (grouse)	Nyrocinae sp.? (duck)	Anserinae sp.? (Canada Goose)	Agnatha (fish)	Large Mammals	Small Mammals	Birds	Fish	Season of occupation presumed to be indicated by animal bones
BENNETT LAKE	JbUg-1												1		1		1					3	4		2	4	4	Summer
COMPLEX	JfUb-4	Level 1													1								1		1		1	Summer
	JiVs-1	Level 1-2					1	1	1		1		1		1			4	1	10	1	5	4	2	4	21	4	Summer
	JhUb-4							1			1		2		1									1	4			Winter
Subtotal for Complex							1	2	1		2		4		4		1	4	1	10	1	8	9	3	11	25	9	
1000 A.D. AISHIHIK	JhVg-1	Zone C									1													1				Winter
COMPLEX	JfVg-1	Level 1-2															1									1		Summer
	JfVg-1	Level 3					1										1							1		1		Summer
Subtotal for Complex							1				1						2							2		2		
200 A.D.	JiVs-1	Level 3									2				2		4						1	2	2	4	1	Summer
	JfVb-4	Level 3					1																	1				Winter
	IeSh-1						1																	1				Winter
TAYE LAKE	KfVc-2	Floor 1			1		1				1			1	1		1							3	2	1		Summer
COMPLEX	JfVg-1	Level 4							1		2						1							2	1	1		Summer
	JfVg-1	Level 5									1		2											1	2			Summer?
	JfVg-1	Level 6			1						1													2				Winter ?
	JfVg-1	Level 7														1									1			Winter
	JfVg-1	Level 8						1			1													1	1			Winter ?
	JfVg-1	Level 9									1				1									1	1			Winter ?
Subtotal for Complex					2		3	1	1		9		2	1	4	1	6						1	14	10	6	1	
2700 B.C.	JfVg-1	Level 10-11			1		1				1					1	1							3	1	1		Summer
GLADSTONE	KfVd-2	Floor 2			1		1																	2				Winter
COMPLEX	JhVg-1	Zone F-1				2	1		1		1	1					2				1			3	3	3		Summer
	JiVs-1	Level 4											1				2								1	2		Summer
Subtotal for Complex					2	2	3		1		2	1	1			1	5				1			8	5	6		
4000 B.C.	KkVa						1																	1				Winter
LITTLE ARM	JiVs-1	Level 5				1	1				1						1							2	1	1		Summer
COMPLEX	KfVd-2	Floor 3			2					1		1					1							3	1	1		Summer
Subtotal for Complex					2	1	2			1	1	1					2							6	2	2		
5300 B.C. CHAMPAGNE	KfVd-2	Floor 4	3	4	3	1	1	2									2							11	3	2		Summer
COMPLEX	KfVd-2	Floor 5		2	1																			3				Winter
Subtotal for Complex			3	6	4	1	1	2									2							14	3	2		
Grand total estimate individual animals			3	6	10	4	11	5	3	1	15	2	7	1	8	2	18	4	1	10	2	8	10	47	31	43	10	

Table 26

Distribution of Identified Bones

		OVIBOS	CERVUS					BISON									ARIODACTYL (small sp.)
		Mandible Immature	Antler	Mandible	Scapula	Phalange	Astragulus	Antler	Mandible	Scapula	Cannon	Phalange	Rib	Vertebra	Acetabulum	Humerus	Long Bone
	JbUq-1																
BENNETT	JfVb-4 Level 1																
LAKE	JiVs-1 Level 1-2																
COMPLEX	JhVf-4																
1000 A.D.	JhVq-1 Zone C																
AISHIHIK	JfVg-1 Level 1-2																
COMPLEX	JfVg-1 Level 3																
200 A.D.	JiVs-1 Level 3																
	JfVb-4 Level 3																
	IeSh-1																
	KfVd-2 Floor 1											2				2	
TAYE	JfVg-1 Level 4																
LAKE	JfVg-1 Level 5																
COMPLEX	JfVg-1 Level 6														1		
	JfVg-1 Level 7																
	JfVg-1 Level 8																
	JfVg-1 Level 9																
2700 B.C.	JfVg-1 Level 10-11										1?			1			
GLADSTONE	KfVd-2 Floor 2													3			
COMPLEX	JhVq-1 Zone F-1																5
	JiVs-1 Level 4																
4000 B.C.	KkVa-2																
LITTLE ARM	JiVs-1 Level 5																1
COMPLEX	KfVd-2 Floor 3										2	5	2				
5300 B.C.	KfVd-2 Floor 4	3	5	1	1	1	1		1	2	2	1	1	3	3		4
CHAMPAGNE COMPLEX	KfVd-2 Floor 5		2			1		1			1						

*Antlers in velvet indicate summer season.

RANGIFER							CASTOR			ERITHIZON DORSATUM		CANIS	ALCES										URSUS	RODENTIA	
Antler	Tibia	Mandible and teeth	Cannon	Astragulus	Metatarsal	Phalange	Teeth	Mandible	Long Bone	Mandible	Long Bone	Mandible	Antler	Mandible and teeth	Humerus	Radius	Canon	Phalange	Vertebra	Rib	Fibula	Astragulus	Mandible and teeth	Mandible and teeth	Long bone
																									1
1*				1		3	1			1										1				2	
							1								1										3
1?													1												
					1																				
																		4	6				1?		
1																									
1																									
1													1								1				
										1				1	1						2				
																1								1	4
																1				1					
								1						1											
			1																			1			
				1																1					
2																									
2*	2	2		1	2						3		1										1		
																								2	
1																									
				1													1								
												1											1		
	1	1					3		9																

Table 26 (continued)

			CAPRA or OVIS		LEPUS					SMALL CARNIVORA	AVES (unclassified)	TANSUS	NYROCINAE	TETRAONIDAE ?		NYROCINAE	ANSERINAE ?		AGNATHA			
			Tooth	Scapula	Mandible and teeth	Vertebra	Phalange	Tibia	Long Bone	Radius	Long Bone	Long Bone	Scapula	Long Bone	Vertebra	Scapula	Scapula	Long Bone	Mandible-Esox lucius	Scale-Salvelinus namaycush	Skull-Salvelinus namaycush	Vertebra-Lota lota
	JbUq-1				1						1							3		4	1	1
BENNETT	JfVb-4	Level 1							1											1		
LAKE	JiVs-1	Level 1-2			1							6	1	11	1	1	1	6	1	2		4
COMPLEX	JhVf-4				2																	
1000 A.D.	JhVq-1	Zone C																				
AISHIHIK	JfVg-1	Level 1-2									2											
COMPLEX	JfVg-1	Level 3									1											
200 A.D.	JiVs-1	Level 3			1	1	1	1	4		5											1
	JfVb-4	Level 3																				
	IeSh-1																					
	KfVd-2	Floor 1	1	1	1						1											
TAYE	JfVg-1	Level 4									1											
LAKE	JfVg-1	Level 5																				
COMPLEX	JfVg-1	Level 6																				
	JfVg-1	Level 7								1?												
	JfVg-1	Level 8																				
	JfVg-1	Level 9							1													
2700 B.C.	JfVg-1	Level 10-11								1	1											
GLADSTONE	KfVd-2	Floor 2																				
COMPLEX	JhVq-1	Zone F-1									3					1						
	JiVs-1	Level 4									2											
4000 B.C.	KkVa-2																					
LITTLE ARM	JiVs-1	Level 5									1											
COMPLEX	KfVd-2	Floor 3									1											
5300 B.C.	KfVd-2	Floor 4									3											
CHAMPAGNE COMPLEX	KfVd-2	Floor 5																				

been winter camps. In view of this observation Zone C of the Gladstone site (JhVq-1), Level 2-3 of the Taye Lake site (JfVb-4), the Callison site (IeSh-1), Floors 2, 3, and 5 of KfVd-2, and KkVa-2 are considered winter camps. Zone A of Canyon Creek Rapids (JhVf-4), without fish or bird bones, may also have been a winter camp. Study of the ages of some of the animals represented by the bones found might further assist in determining the season of the various occupations. Unfortunately, this was not possible.

Since animals are often adapted to certain vegetation zones and climates a study of the bones often suggests vegetational and climatic changes or periods. Of particular significance are the moose, elk, musk ox, and buffalo. The latter three are now extinct in the Yukon. Generally speaking, the moose is a boreal forest animal, elk and bison occur in grasslands, and musk ox is a tundra animal. The dominance of musk ox, elk, and bison as well as the complete absence of moose in the Champagne phase may be interpreted as indicating that the southwest Yukon at that period was predominantly a grass- and tundra-covered region with little or no boreal forest. In the following Little Arm, Gladstone, and Taye Lake periods the elk and musk ox are completely absent and the bison are decreasing as the moose increase. This may mean that the boreal forest was invading the southwest Yukon and gradually squeezing out the grasslands in the valleys and the tundra in the uplands. The complete absence of buffalo bones and the dominance of moose after Taye Lake times may indicate that the present-day type of vegetation had arrived. These three floral and faunal periods indicating the presence of certain climates may be correlated with certain recent geological periods. Is it not possible that the final period with the same faunal assemblages as today is our present Medithermal period extending back roughly to 2000 B.C.? Further, is it not possible that preceding this period, when buffalo and moose were present, the boreal forest was pushing out the grasslands and that this is the warmer period of the Altithermal from 2000 to 5000 B.C.? And finally, is it not possible that this earlier period when musk ox, elk, and bison were dominant was the colder Anathermal period which followed the last glaciation? Other studies seem to show that the answer to these questions raised by the faunal studies is in each case, yes.

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AINH-TP	Arctic Institute of North America, Technical Papers. Montreal, Quebec.
ABC	Anthropology in British Columbia, Victoria, B.C.
AM ANT	American Antiquity. Menasha, Wisc. and Salt Lake City, Utah.
AMNH-AP	American Museum of Natural History, Anthropological Papers. New York, N. Y.
ARC ANTH	Arctic Anthropology, University of Wisconsin, Madison, Wisc.
BCPM	British Columbia Provincial Museum. Victoria, B.C.
GSC-M	Geological Survey of Canada, Memoir, Ottawa, Canada.
NMC-AR	National Museum of Canada, Annual Report. Ottawa, Canada.
NMC-B	National Museum of Canada, Bulletin. Ottawa, Canada.
SAA-M	Society for American Archaeology, Memoir. Menesha, Wisc.
UA-AP	University of Alaska, Anthropological Papers. College, Alaska.
YU-PA	Yale University Publications in Anthropology. New Haven, Conn.

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